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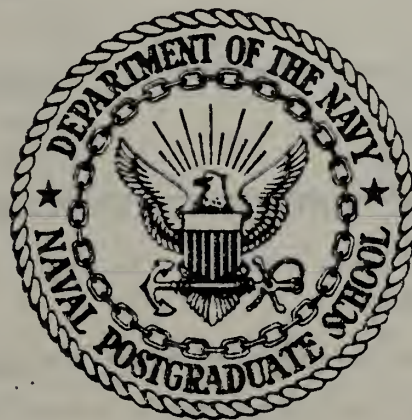
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THESIS

A CONTEXTUAL ANALYSIS OF THE COMBINED
SERVICE: A SIGNIFICANT COMPONENT OF THE
MILITARY SEALIFT COMMAND'S BREAKBULK
CAPABILITY

by

Margaret Randolph Earle

December 1983

Thesis Advisor:

D.C. Boger

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T215156

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS
BEFORE COMPLETING FORM

1. REPORT NUMBER

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)

A Contextual Analysis of the Combined Service: A Significant Component of the Military Sealift Command's Breakbulk Capability

5. TYPE OF REPORT & PERIOD COVERED

Master's Thesis
December 1983

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)

Margaret Randolph Earle

8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS

Naval Postgraduate School
Monterey, California 93943

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS

Naval Postgraduate School
Monterey, California 93943

12. REPORT DATE

December 1983

13. NUMBER OF PAGES

251

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)

15. SECURITY CLASS. (of this report)

Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Breakbulk, Military Sealift Command, Cargo, Sealift, Merchant Marine, U.S. Flag Fleet, Sealift Readiness, Defense Transportation, Maritime Industry.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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A Contextual Analysis of the Combined Service:
A Significant Component of the Military Sealift
Command's Breakbulk Capability

by

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
December 1983

ABSTRACT

This thesis focuses on the Combined Service, a five ship scheduled breakbulk shipping operation, managed by the Military Sealift Command, Pacific. The object is to define the operation within the context of U.S. breakbulk requirements and worldwide breakbulk assets so as to provide a broader perspective to military decision makers. The research effort is directed at identifying major internal and external environmental factors impacting the Combined Service. Once these factors are addressed from a general perspective, their significance is specifically related to the Combined Service. The conclusion notes five trends observed throughout the analysis that should be considered when determining future utilization of limited U.S. breakbulk assets.

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ABBREVIATIONS AND ACRONYMS

ADP	Automated Data Processing
AF	Refrigerated Cargo Ship Classification
AISA	Automated Information System Architecture - an ongoing MSC system development
AK	Dry Cargo Ship Classification
AKR	Vehicle Cargo Ship Classification
BBL	Liquid cargo capacity (less 2% for expansion) - barrels
CALSTAT	Cargo Ship Location, Status, and Utilization Subsystem - a MSC management model
CCF	Capital Construction Fund - replaced CRF
CDS	Construction Differential Subsidy
CNO	Chief of Naval Operations
COFC	Container on Flatcar
COMSC	Commander, Military Sealift Command (Washington, DC)
COMSCFE	Commander, Military Sealift Command, Far East (Yokohama, Japan)
COMSCGULF	Commander, Military Sealift Command, Gulf Sub-Area (New Orleans, LA)
COMSCLANT	Commander, Military Sealift Command, Atlantic (Bayonne, NJ)
COMSCPAC	Commander, Military Sealift Command, Pacific (Oakland, CA)
CONUS	Continental United States
COTS	Container Offloading and Transfer System
CRF	Capital Reserve Fund

CS	Combined Service
DoD	Department of Defense
DTS	Defense Transportation System
DWT	Deadweight Tons
EEC	European Economic Community
EUSC	Effective United States Controlled
FEMA	Federal Emergency Management Agency
FOS	Full Operational Status
GAA	General Agency Agreement
GNP	Gross National Product
GT or Gross	Gross Registered Tons
HHG	Household Goods
ICC	Interstate Commerce Commission
JLOTS II	Joint Logistics-Over-the-Shore II
LASH	Lighter Aboard Ship
LNG	Liquified Natural Gas
LO/LO	Lift-up/Lift-over
LOTS (later JLOTS I)	Logistics-Over-the-Shore
MARAD	Maritime Administration
MECOBO	Military Export Cargo Offering and Booking Office
MID-PAC	A MSC breakbulk shipping route to the Mid- Pacific Islands
MILSTAMP	Military Standard Transportation and Movement Procedures

MILVANS	Shipping containers owned and controlled by the Army
MLSF	Mobile Logistic Support Force
MOTBA	Military Ocean Terminal, Bay Area
MPS	Maritime Prepositioning Ships
MSC	Military Sealift Command
MSCVAN	Shipping containers owned and controlled by MSC
MT or MTON	Measurement Ton
MTM	Measurement Ton Miles
MTMC	Military Traffic Management Command
MTS	Measurement Tons Steamed
NADEC	Navy Decision Panel
NAVCHAPGRU	Navy Cargo Handling and Port Group
NBC	Nuclear/Biological/Chemical
NDF	National Defense Features
NDRF	National Defense Reserve Fleet
NIF	Navy Industrial Fund
NTPF	Near Term Prepositioning Force
OBO	Oil/Bulk/Ore
ODS	Operating Differential Subsidy
OSD	Office of the Secretary of Defense
P/(L)	Profit/(Loss)
PND	Ports for National Defense
POE	Port of Embarkation
POD	Port of Debarkation

POV	Privately Owned Vehicle
PROFORMA	A MSC management model
RDD	Required Delivery Date
RO/RO	Roll-on/Roll-off
ROS	Reduced Operating Status
RRF	Ready Reserve Force
SEABEE	Sea Barge
SOA	Speed of Advance
SRP	Sealift Readiness Program
TCDF	Temporary Containership Discharge Facility
TM	Ton Miles
TOFC	Trailer on Flatcar
Tri-Coast	A MSC breakbulk shipping route between the East, Gulf, and West Coasts and then to the Far East
UNCTAD	United Nations Conference on Trade and Development
USNS	United States Naval Ship (a MSC Nucleus Ship)

DEFINITIONS

Aircraft Cargo - Whole aircraft or complete fuselage whether or not engines are installed. Does not include spare parts, engines, aircraft repair supplies or boxed aircraft.

Ammunition/Hazardous Cargo - Includes explosives projectiles, bombs, mines, inflammable liquids, radioactive waste, powder, dynamite or any other hazardous commodity which requires specialized handling or stowage.

Barrels - Forty-two (42) gallons, 5.615 cu. ft. in volume.

Bulk - Unpacked dry or liquid cargo such as coal, grain, ore, sulphur, fertilizer and edible oil.

Deadweight - The total lifting capacity of a ship, expressed in tons of 2240 lbs. It is the difference between the displacement light and the displacement loaded. Cargo Deadweight capacity is determined by deducting from total deadweight the weight of fuel, water, stores, dunnage, crew, passengers, and other items necessary for use on a voyage.

Displacement, Light - The weight of the ship excluding cargo, fuel, ballast, stores, passengers, crew, but with water in boilers to steaming level. (Often used in a U.S. Navy ship description.)

Displacement, Loaded - The weight of the ship including cargo, passengers, fuel, water, stores, dunnage and such other items necessary for use on a voyage, which brings the ship down to her loaded draft.

Draft - The draft of a vessel is indicated in fleet and is the vertical distance between the waterline and the keel. The draft shown in this thesis is full-load draft.

Dunnage - Any materials, such as boards, mats, planks, blocks, pallets, etc., used to protect and secure cargo or for convenience in handling and stowage of cargo.

Flags of Convenience - Such flags under which there exists no genuine link between the state and the ships, and, in particular, under which the state does not effectively exercise its jurisdiction and control in administrative, technical, and social matters over ships flying its flag.

General Agency Agreement (GAA) Ships - Those government-owned ships which are in the custody of the Maritime Administration (MARAD), and which have been activated from the National Defense Reserve Fleet or requisitioned for title on bareboat charter and which are operated by General Agents and crewed by merchant mariners, per agreement with MARAD, for account of MSC.

Gross Tonnage - The entire internal cubic capacity of the ship expressed in tons of 100 cubic feet to the ton, except certain spaces which are exempted, such as: (1) peak and other tanks for water ballast; (2) spaces above the uppermost continuous deck, such as: open forecandle, bridge and poop, certain light and air spaces, domes of skylights, condenser, anchor gear, steering gear, wheel house, galley and cabins for passengers. (Also Gross Registered Tonnage.)

Knot - The speed of a ship is expressed in knots; one knot is one nautical mile (6,080.27 feet) per hour.

Long Ton (Weight Ton) - 2,240 lbs.

Measurement Ton - Bale cubic in units of 40 cubic feet to the ton. A capacity of 10,000 MT is the same as 400,000 bale cubic.

Net Tonnage - The tonnage most frequently used for the calculation of tonnage taxes and the assessment of charges for wharfage and other port dues. Net tonnage is obtained by deducting from the gross tonnage, crew and navigating spaces and an allowance for the space occupied by the propelling machinery. (Also Net Registered Tonnage.)

Manifest (Cargo) - A detailed listing by type of all cargo loaded into one conveyance.

MSC Chartered Ships - Privately owned ships of the U.S. Merchant Marine or, occasionally, foreign flag ships chartered by MSC and crewed by merchant mariners. The contractual agreement may be Time Charter (TC), Voyage Charter (VC), or Consecutive Voyage Charter (CVC).

MSC Nucleus Fleet Ships - Those United States Naval Ships (USNS) owned by the U.S. Government or bareboat chartered to MSC and permanently assigned to MSC for administration and operation. These USNS ships are active status in-service ships, which are either civil service manned or contract-operated with union crews.

Privately Owned Vehicles (POVs) - A vehicle belonging to an individual rather than a government agency.

Radioactive Material - Radioactive material cargo moved in special containers.

Reefer - Perishable commodities such as meats, vegetables, fruits, butter, eggs, and poultry which require refrigeration (chill or freeze) storage.

Shipping Contract, Berth Term Ships, Shipping Agreement and Container Contract - MSC Shipping Contracts are agreements between MSC and common carrier steamship companies for the ocean transportation of cargo in less than shipload quantities. The carriers are paid on a basis of so much per cubic foot or on the weight of the cargo, whichever is the greater. In many instances new rates have to be negotiated, for the lifting of specific items.

Short Ton (Net Ton) - 2,000 lbs.

Special Cargo - All commodities which weigh more than 10,000 pounds or measure more than 35 feet in any dimension. It includes wheeled and tracked vehicles unless they are readily identified; then they will be classified as Special Cargo Vehicle. Does not include privately-owned vehicles, uncrated aircraft, or stake/van type cargo-carrying trailers loaded on MSC "roll-on/roll-off" type ships.

Special Cargo Vehicles - Readily identified wheeled and tracked vehicles regardless of weight or dimensions. Does not include privately-owned vehicles, uncrated aircraft, or stake/van type cargo-carrying trailers loaded on MSC "roll-on/roll-off" type ships.

Trailers, Cargo Carrying - Van, stake, or platform type trailers loaded on MSC controlled "roll-on/roll-off" type ships.

Voyage Chartered Ships - This type of charter calls for the carriage of such cargoes as bulk grain, coal, etc., from the point of origin to a final discharge port. These ships are chartered from various steamship companies throughout the country. COMSC pays the owners a lump-sum for these lifts. Upon completion of discharge the ships revert back to the owners at that point and are used for a commercial lift homebound if available, or sailed in ballast.

Voyage Number - A consecutive three character, zero filled number assigned for MSC controlled ships. It is used to account for consecutive voyages of dry cargo ships.

I. INTRODUCTION

A. BACKGROUND

The Combined Service (CS) was created to meet a specific set of needs within a specific set of constraints. The mission requirements for an outbound and inbound East Coast - Gulf Coast - West Coast - Far East (including the mid-Pacific islands) scheduled breakbulk shipping operation were defined as early as 1973. The primary Military Sealift Command (MSC) participants in the evolution of the Combined Service include:

- a. Commander, Military Sealift Command (COMSC),
- b. Commander, Military Sealift Command, Atlantic (COMSCLANT),
- c. Commander, Military Sealift Command, Gulf Sub-Area (COMSCGULF),
- d. Commander, Military Sealift Command, Pacific (COMSCPAC), and
- e. Commander, Military Sealift Command, Far East (COMSCFE).

In any Department of Defense (DoD) environment, decisions are often implemented long after they were originally justified. The original decision makers may no longer be available to explain how or why a program developed as it did. In such situations, it is not unusual for the managers that inherit an operational entity to continue justifying the organization and operations by resurrecting, as required, the earlier justifications that had proven

successful. However, times change and a reasonable justification five years ago may no longer be reasonable today.

The Combined Service, because it is a small, well-defined operation, lends itself to periodic scrutiny to ensure it is still viable and justifiable within the context of breakbulk shipping as a national and international asset in peacetime as well as various mobilization scenarios.

B. PURPOSE

The purpose of this thesis is threefold. Firstly, because history does have a tendency to repeat itself and recurring problems are seldom unique, an attempt has been made to gather together a history of recent MSC breakbulk operations. By showing the evolutionary process that culminated in the establishment of the Combined Service, many of the early decisions can be clarified by being shown in context. A review of the organizational structure of the CS management as well as the early problems that had to be addressed helps to show how the managers perceived the Combined Service mission as part of a much larger set of responsibilities.

The second purpose is to describe the related environment external to the Combined Service. The environment includes the Military Traffic Management Command (MTMC) as cargo coordinator and port operator, the shipper services as demanders of service, and the U.S. and world oceanborne

shipping as alternate providers of shipping services. Significant U.S. and international legislation is also included as part of this environment as well as domestic transportation as an intermodal competitor. The rapidly changing technology base and mobilization strategies also significantly impact demand. Once this external environment is developed, the Combined Service can be related to each of the major components.

As the Combined Service is discussed with respect to its internal and external environments, the third purpose of this thesis becomes clear. Trends can be pointed out that can impact long range decisions concerning the Combined Service. The world shipping markets change, political strategies change, and cargo handling techniques change which necessitates a continual reevaluation of operational goals and objectives. By putting the Combined Service into context, hopefully decision makers will be provided with a less insular view so that better decisions, both active and passive, will be made.

C. ASSUMPTIONS

This thesis is not an operational analysis. The volumes of computerized data concerning the Combined Service available to MSC managers present the operations in a detail far beyond the analytical scope of this thesis. Although a considerable amount of operational data were reviewed, the

deductions of professional MSC analysts concerning the operational effectiveness of the Combined Service were accepted and used, where appropriate.

Because the Combined Service was the focus of this thesis, analysis of breakbulk cargoes and shipping patterns was the primary emphasis. When data could not be broken down into strictly breakbulk cargo information, the discussion was expanded to dry general cargo or even to dry cargo depending on the level of detail available. Ammunition and other hazardous cargo was ignored whenever possible as they present an entirely different set of shipping problems.

The most current data available to the author was used. Potential confusion due to the use of information from differently dated sources has been reduced as much as possible by the clear representation of source dates on tables and figures or in the text, as appropriate.

D. ORGANIZATION

This thesis is divided into an introduction, four research chapters, and a final chapter of summary and conclusions. The four research chapters were organized to be read from the specific, to the general, and then back to the specific. Chapter II provides an historical overview of the Combined Service. Chapters III and IV describe significant factors in the external environment of the Combined

Service as well as potential impacts. Chapter V integrates information from the previous three chapters to help define and evaluate the current role of the Combined Service and its potential as a resource in the future.

Three appendices are also included. Appendix A provides a comparison of actual dry cargo moved by MSC in the post-Vietnam year of 1975 and in a more current year of 1981. Appendix B is included to display, in detail, the responsibilities of both the government (MSC) and the contractor in every agreement to time charter a commercial vessel. Appendix C provides an example of the level of detail to which the Combined Service manager monitors voyage costs.

II. THE COMBINED SERVICE

A. SOURCES

One of the purposes of this thesis is to gather together in one location a recent history of Military Sealift Command (MSC) breakbulk shipping operations preceding and including the Combined Service (CS). To obtain information to support a history of this type, over one hundred documents including messages, letters, briefing packages, point papers, reports, internal and external studies, organizational data, and operating files were reviewed. These documents came primarily from MSCPAC (3T) and MSC (3T) files and spanned the time frame of 1973 through 1983. Discussions with numerous MSCPAC and MSC headquarters staff personnel have updated these documents and provided additional information. Information that the author considers to be of a general historical nature and/or commonly available within the MSC organization will not be referenced specifically. Particularly important decisions or issues may be quoted directly and will be referenced appropriately. Contextual referencing will be used to display sequencing of time frames and to clearly identify the parties involved.

B. HISTORY

The Combined Service, as it was approved on 15 June 1979, was not so much a new idea as a result of a lengthy evolutionary process. A worldwide scheduled breakbulk shipping operation, established by MSC in the early 1960's, had been allowed to lapse and a more typical tramp shipping service had taken its place. Serious difficulties encountered in moving cargoes, specifically breakbulk, from and to ports under MSCPAC cognizance prompted RADM Guest, COMSCPAC, in December 1973, to recommend to COMSC the reinstatement of a scheduled worldwide service to improve service on the following routes:

- West Coast to East Coast,
- West Coast to Europe,
- Hawaii to East Coast,
- Hawaii to Far East,
- Hawaii to U.S. Gulf Coast, and
- Coastwise (West Coast).

COMSCPAC envisioned the utilization of controlled ships plying between Europe and the Far East touching the U.S. East Coast/Gulf and U.S. West Coast/Hawaii in each direction on a regularly scheduled basis. A roundtrip voyage would take about four months, allowing an east-bound and west-bound sailing each month. He expected that a reliable "worldwide" service would be well received and patronized by the shipper services.

In response to this request, COMSC initiated an analysis based on projected breakbulk requirements, recommended ports

of call, and a four C-4 ship simulation at 21 knots using 1 July 1973 fuel costs. The conclusions were that the proposed service appeared feasible. Comments and recommendations were elicited from the area commands.

For unknown reasons, the recommendation lay dormant for over two and one half years. It was reintroduced in the summer of 1976 when efforts were being made to implement a program designed to productively employ MSC controlled ships in full operational status (FOS). At that time, COMSC, in a confidential letter (since declassified), stated to his in-house staff and area commanders:

"In recent years due to a number of factors including troop reductions overseas, more impetus on containerization and constraints placed on transportation dollars by the Congress, MSC is facing a crisis in maintaining a readiness posture sufficient to meet future contingencies. Choices must be made on how best to maintain an acceptable readiness posture in the form of ship capability during periods of reduced cargo requirements. In recognition of the critical size question for the MSC Fleet, the Chief of Naval Operations convened the Navy Decision Panel (NADEC) chaired by the Vice Chief of Naval Operations on 25 July 1975 to explore the minimum force acceptable for adequate responsiveness and flexibility to provide support of fast reaction military operations and other emergency activities in the national interest. The Navy and the Department of Defense have affirmed the need for an "in house" sealift capability under direct and immediate control; this capability is to be provided by MSC. Analysis has indicated that an MSC Controlled Dry Cargo Fleet of 27 ships can provide an aggregate average early assets availability of approximately ten ships in ten days. This capability can be regarded as the minimum acceptable, and to preserve this capability the Navy has programmed FY 77 readiness funding for the MSC Fleet. The funds made available for this purpose will only provide for a relatively few ships to be maintained in a Ready Reserve Status, thus requiring that the remainder of the 27 ships be productively employed." [Ref. 1]

This statement became the cornerstone for the policies that emerged over the next four years beginning with the recommendation by COMSCFE on 7 September 1976 to further increase the effective utilization of the MSC controlled dry cargo fleet by "instituting a Far East - Gulf/East Coast dedicated service in addition to the present MID-PAC service."

It is appropriate at this time to specify what services did exist at that time and what exactly was being recommended. COMSCLANT was then providing extensive East Coast to Europe/Med shipping as well as three ships every two months from the East Coast/Gulf directly to the Far East and back. Since 1972, an operation called MID-PAC (or PAC SKED), managed by COMSCPAC, had also existed. It provided regular service from the California and Northwest Coasts to Hawaii/Guam (MID-PAC), then to the Far East and back. There was no direct East Coast-Gulf-West Coast service. Of particular concern was cargo from the Far East to the Gulf Coast and POV's from Hawaii to the East Coast/Gulf. Consequently, there was a substantial amount of transshipment required that was both costly and time consuming. The method of transshipping breakbulk cargo was that cargo was booked for the movement to a transshipping port, then reoffered and rebooked to the final destination. The shipper was billed shipping charges from loading port to the transshipment port, transshipment port to destination port, and the discharging/holding/loading costs at the transshipping port.

The shipper had to pay the extra cost for the handling at the transshipping port plus the difference in the transshipped cost as compared to a direct lift. Correspondence from this period indicated customers were not happy. What was being proposed was a three coast to Far East route to alleviate some of the transshipment problems.

The suggested itinerary for this "Tri-Coast" service, as it came to be called, was Oakland-Yokohama-Pusan-Naha-Subic-Hawaii-New Orleans-Norfolk-Bayonne-Oakland, totalling approximately 89 days. An informal cost study was prepared by MSC in September 1976 that indicated revenue for the monthly average tonnages from the four Far East ports to Gulf and East Coasts would cover 40 percent of the ship cost for one round trip. It was anticipated that the 60 percent deficit could be covered by other opportune cargo.

After much discussion and general concurrence that the scheduled service would reduce costs by being a more controlled and consequently cheaper way to get cargo to out-of-the-way Pacific destinations, the Tri-Coast service concept was approved in March 1977. It would use four C-4 Challenger class ships, operating at 16 knots and scheduled to maintain a 30 day sailing frequency. Sixteen knots was chosen to reduce fuel costs and to keep the ships at sea longer. MSC was over-capacitied with 27 ships; therefore slowing them down helped keep them productively, if not efficiently, employed. Each voyage would commence in

Bayonne and last about 100 days roundtrip. Upon completion of the voyage, the just returned ship would be placed in Reduced Operating Status (ROS), about 20 days, until commencement of the next scheduled voyage, assuming no opportune lift was available. The basic route would be East Coast-Gulf Coast-Canal Zone-West Coast-Hawaii-Far East-Hawaii-West Coast-Canal Zone-Gulf Coast-East Coast. Slight changes to the itinerary within command area would be acceptable depending on cargo availability. Cost analyses indicated a profit of \$1,884,000 per ship per year.

Additional justification was stated as follows:

"Such a scheduled service would offer several advantages over the present tramp-type operation. It is axiomatic that scheduled voyages attract cargo. When the shipper can rely on a ship being available at published times he can better plan his cargo movements. Ship operating time is maximized, although ROS periods are planned to ensure schedule integrity. During periods of low cargo generation the ships continue to operate; whereas, with the tramp system a ship would be layed up unless ship-load lots of cargo are available. Providing ships to the Far East on a regular basis enhances MSC's contingency responsiveness by stabilizing the lift capability into that area. From an administrative viewpoint, both budget planning and cargo lift planning are enhanced since vessel operation's are well defined.

"Regarding peacetime cargo movement between the three CONUS coasts and the Far East, scheduled voyages will improve lift capability for traditional hard-to-lift cargo for which even commercial service is difficult to arrange. This includes cargo moving between the Far East and the Gulf Coast, and POV's from Hawaii to the Gulf and East Coasts. Such cargo becomes either very "old" awaiting controlled fleet lift, or is finally shipped commercially, if service is available, at higher costs. An example of the foregoing would include small lots of cargo from Subic where regular MSC controlled lift to the East Coast is not now available and commercial calls require an inducement. Also, POV's moving from Hawaii and California

to the East Coast are a continuing, heavy requirement now being lifted commercially at substantial cost. Finally, there is a steady, reasonably heavy movement of New Orleans destined cargo, mostly POV's from Hawaii, for which the only available shipping is the occasional East Coast or Gulf controlled ship returnee. Lack of any regular service in this direction has generated frequent shipper service complaints." [Ref. 2]

A third justification, based on an impact analysis, caused considerable discussion in MSC headquarters as some felt that Lykes and Waterman, two major U.S. Flag shippers in the Far East trade, could lose as much as 50 percent of their current DoD Gulf Coast to Far East business if the Tri-Coast service were instituted.

There was not enough concern on this point, however, to alter plans and a six-month test of the Tri-Coast service was instituted in May 1977. The primary ports of call were Bayonne, Norfolk, New Orleans, Mobile, Oakland, Pearl Harbor, Subic Bay, Keelung, Naha, Pusan, and Yokohama. COMSCLANT was tasked with assigning the ships, publishing a voyage schedule, coordinating MSC Continental United States (CONUS) loading activities, and assigning specific cargo spaces for subsequent loads. Problems typical to this type of service in the past included no space for cargo booked at final loading port, overstows, and cargo frustration. Complete coordination, astute management and free communication were stressed to ensure problems were reduced to a minimum.

The six month test proceeded with little comment from the Pacific area commanders except some minor itinerary changes to better interface with the MID-PAC service and to institutionalize some speed flexibility. However, a serious complaint was voiced by COMSCLANT on 9 September 1977 when he stated in a message to COMSC:

"Prior to the initiation of the present Tri-Coast service COMSCLANT/COMSCGULF were sending approximately three ships every two months directly to the Far East. At the present time, because of the reduced frequency of sailings (one a month) and the requirement to reserve space for the West Coast, COMSCLANT/COMSCGULF routinely shut out available Far East cargo which in turn must be booked commercially to meet cargo requirements.

"All available information indicates future cargo generation will continue at present levels. Accordingly, with the expected winter decline in West Coast cargo generation indicated by COMSCPAC, rather than cancelling or delaying the MID-PAC service, it is recommended that the Tri-Coast ship by-pass the Pacific Coast outbound since there is adequately East/Gulf Coast cargo to fill out the ship directly for the Far East. When West Coast cargo generation dictates, routing via the West Coast could be resumed on a case by case basis. Deletion of the West Coast ports would reduce the ship's transit time to the Far East and thus provide more timely service from East/Gulf Coast ports." [Ref. 3]

This request for a deviation to the schedule, even though appearing reasonable, was deemed to be inappropriate as it would risk the "advertised" reliable nature of the service which in turn was considered by many to be its major selling point in influencing cargo generation, accumulation, and routing. MSC headquarters personnel stated more than once that while adherence to the promulgated schedule might incur additional costs, such costs were for a predetermined

purpose and, until the overall concept was validated, the costs would continue to be knowingly incurred.

By 2 December 1977, a complete review had been made of the Tri-Coast service and several substantive issues were put forward by COMSCPAC for consideration and/or resolution at the next area commander's conference. These issues related to:

a. Resumption/assumption of normal facets of ship operating responsibilities associated in providing ocean transportation and berth line service including:

(1) Individual voyage planning and associated requirements for cargo cut offs, cargo storage planning and approval of ship following by individual shipboard cargo planner for continuity, and space allocation versus voyage cargo planning.

(2) Cargo plans relative to required distribution and some system for ensuring proper distribution, contents, size, labeling, etc.

(3) Requirements for individual MSC representatives to be aboard loading ships continuously during cargo operations at various ports and the associated personnel requirements.

b. Scheduling of berth line service and guidance concerning patterns and controls, adherence to schedules,

normal calls versus inducement calls, frequency of service, influence/effect of Tri-Coast/MID-PAC service on each other.

c. Method of accounting/budgeting for operational costs defining what is a loss/profit in view of contingency fleet and alternatives for routing ships. How should budgeting be accomplished? What impact would this have on monthly summary data and voyage analysis reports?

d. Feasibility of influencing cargo flow to controlled ships/terminals through increased schedule service; the consequent improvement of ship/terminal utilization with possible resultant reductions in excessive overhead costs.

e. Factors influencing the reestablishment of MSC as a fully participating member with MTMC in the overall transportation effort so that planning responsibilities were distributed to both organizations.

f. Providing active supervision over ship operations versus administrative reporting with consequent personnel impact.

On 17 February 1978, the Tri-Coast service was declared both desirable and necessary and was fully approved by COMSC as a permanent dedicated service.

In May 1978, integrated area command block scheduling of both the MID-PAC and Tri-Coast services was initiated to prevent duplication of port calls. Significant improvements were also made in communications and transmittal of ship's papers.

However, problems continued with the operations. Analyses performed upon completion of each voyage showed a profit of \$170,000 on the first one and each subsequent voyage losing money. In fact, in October 1978, after twelve complete voyages, an average loss of \$322,500 per voyage was reported with an average utilization of 42 percent outbound, 19 percent intra-area, and 41 percent inbound [Ref. 4]. Note that there was no broken stowage factor applied at that time. Currently a factor of .4 is used to account for broken stowage meaning only 60 percent of the space below decks represents "real" capacity. Consequently, if the broken stowage factor had been applied, these utilization factors would increase to 70 percent, 32 percent, and 68 percent respectively.

While COMSC was prepared to send a message to shipper services requesting fuller utilization of scheduled MSC service, he was also aware that an intra-MSC management review was appropriate first. By this time, headquarters staff level personnel had perceived several possible problem areas including:

- a. East Coast outbound cargo being shut out, indicating a review of allocations.

- b. Ships sitting idle at overseas ports in order to maintain block schedules, indicating too much time allocated for some ports.

c. Inbound voyages reported full, but only 41 percent (68 percent) utilized, indicating possible poor prestows.

These and other problems were discussed at length and on 2 November 1978, COMSCLANT proposed to combine the Tri-Coast and MID-PAC services utilizing five ships with a 30 day frequency and a voyage length not to exceed 150 days. There would be two voyage variations that would be routinely alternated.

At an operations management conference on 11 December 1978, it was agreed to combine the two services into one with departures on alternate coasts, e.g., the Far East voyage would terminate on the East Coast and vice versa. Sailing frequency was to be approximately 29 days with ships proceeding at 16 knots but minimizing port time. The service would be provided by six instead of seven ships and the block schedule characterized by scheduled arrival/departure times would be replaced by a slightly more flexible scheduled itinerary known as a "spread" schedule. In January 1979, COMSC approved the merger of the two services and on 27 April 1979, the results of the 24 April 1979 operations management conference were promulgated naming the newly merged service the "Combined Service" and assigning overall single voyage management to COMSCPAC on a trial basis. On 25 May 1979, COMSCPAC documented its policy

and procedures for managing the Combined Service and on 15 June 1979 officially assumed responsibility.

C. MANAGEMENT

1. Organization

The MSCPAC Transportation Office (P-3T) performs the function of Combined Service manager through an extensive process of scheduling and continuous evaluation. As reflected in Figure II-1, the department has two major divisions. The Cargo Traffic Division (P-3T1) prepares long and short range schedules incorporating projected cargo requirements, adhering to a 30 day sailing frequency from the East and West Coasts, and a maximum utilization of cargo space available. Cargo lift requirements are referred to the Cargo Traffic Division where they are assigned to specific voyages and input to the Military Traffic Management Command, Western Area (MTMCWA) for the development of stowage plans.

The Dry Cargo Ship and Point-to-Point Tanker Operations Division (P-3T2) monitors ongoing voyages as closely as possible and incorporates schedule changes when necessary due to the changing requirements or upon receipt of validated recommendations from other area commanders. This division also maintains detailed statistics concerning cargo flow among various ports, costs and revenues for each port, and the cost for transit between ports. This data is

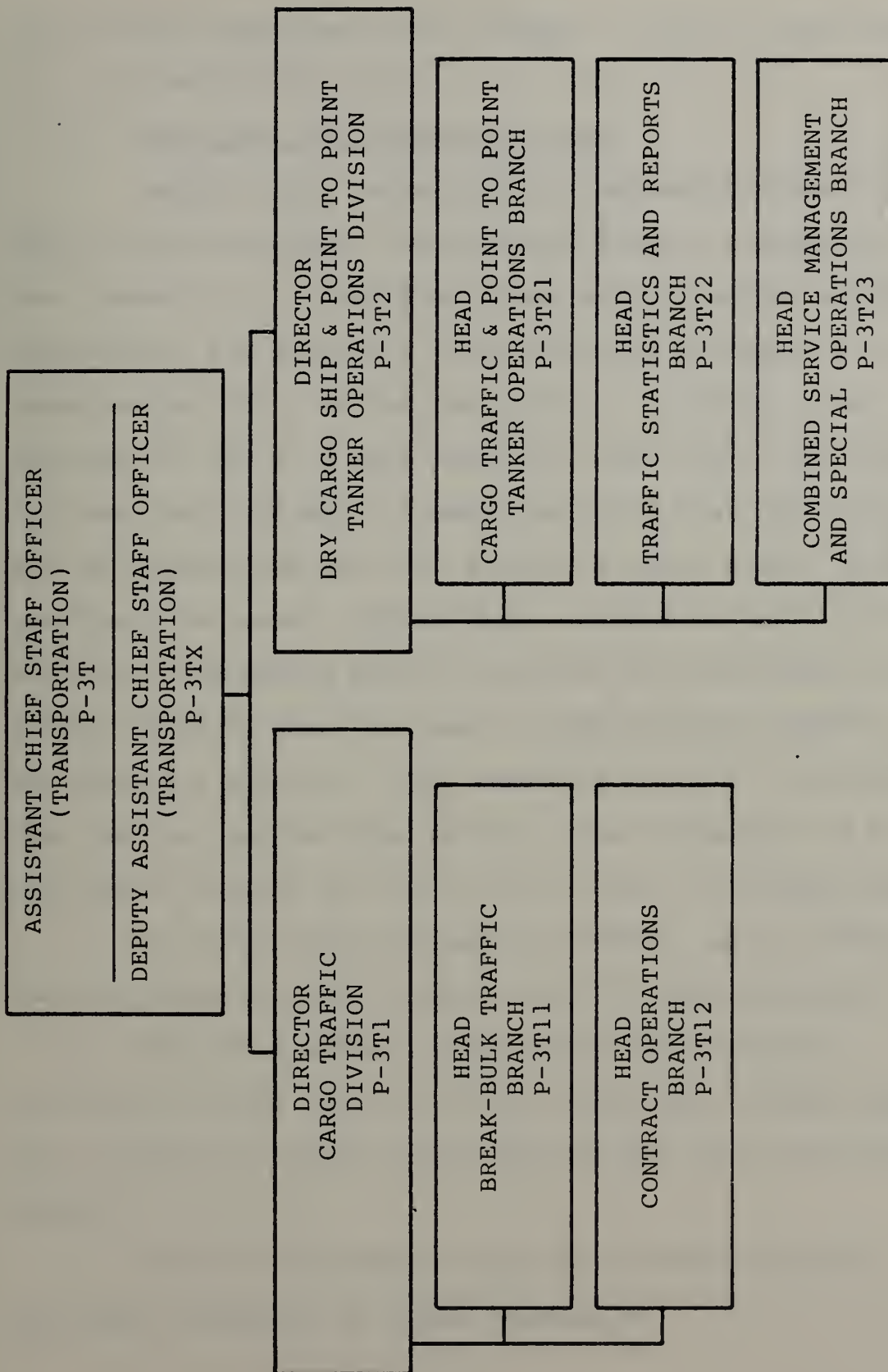


Figure II-1. MSCPAC Transportation Office (Combined Service Manager)
Organizational Chart

continuously analyzed in an attempt to identify improvements for the Combined Service.

2. Functions and Responsibilities

MSCPAC, upon assumption of responsibilities, stated that it would approach the Combined Service management from the viewpoint of a functional loss control center which was responsible for achieving required cargo movements at the least overall cost to the government. In other words, while the goal of MSC as a Navy Industrial Fund (NIF) activity is to break even overall, it was understood that the nature of the CS mission and the rate structure would rarely produce profitable voyages. Within these overall guidelines, all individual movements would, in-so-far as practicable, be accomplished so that the costs to MSC would be reduced to the absolute minimum. This "absolute minimum" has never been defined and for that matter, does not appear to be of particular concern as long as the mission is accomplished.

To support this objective, MSCPAC, as the Combined Service manager, would perform the following functions:

a. Publish a monthly Combined Service schedule.

Individual voyage itineraries and subsequent voyage planning will be based on inputs received from MSC activities and CS vessels.

b. Monitor individual voyage progress and modify published schedules as deemed necessary.

c. Designate bunkering ports.

d. Act as the singular clearance authority for planned overstows.

e. Continuously review overall cargo planning with a view towards implementing improvements.

f. Monitor recommendations to COMSC for improvements to the overall operation of the Combined Service.

COMSCLANT and COMSCFE were directed to:

a. Operate ships in accordance with published schedules while in their geographic areas of responsibility in order to achieve the best balance of overall cost and revenue.

b. Vary ship itineraries as required for circumstances and/or requirements which would in essence have a net positive effect on earnings or which were dictated by critical DoD lift requirement. Changes to the itinerary which could have a negative effect on earnings would not be made without the CS manager's approval unless such changes are required by unusual circumstances such as weather, medical emergency, etc. The CS manager would query changes when overall cost effectiveness appeared questionable.

c. Coordinate with MTMC Combined Service cargo bookings and oversee terminal cargo stowage/planning in accordance with normal operational procedures.

d. Forward cargo stowage plans to the next scheduled port for planning purposes by the fastest means available for all CS vessel port calls.

- e. Submit CS related reports as required.
- f. Clear planned overstows with the CS manager.
- g. Evaluate overtime, fuel, port changes, and other costs for each voyage in order to minimize costs to the U.S. Government.

To support these functions and responsibilities, reporting requirements from the field provide detailed information related to cargo lift requirements, cargo loading and discharging, and port performance. Because port performance constitutes a major portion of the overall voyage costs, both cost data and cargo information are required within five days after departure of the ship from each port. Cost data include estimated port costs (i.e., pilotage, tugs, wharfage), estimated MSCVAN costs for required staging and loading/discharging, bunkering information, and estimates of any special costs. Cargo information includes such things as cargo utilization below decks, availability of deck space after discharge, and empty space blocked by overstowing. Similar data are provided for the weather decks. Additional cargo information relates to overstows, heavy lift requirements, security problems encountered or anticipated, cargo shut-outs, Speed of Advance (SOA) ordered, and any miscellaneous comments on port operations.

Another major component of voyage cost is fuel. In view of worldwide fluctuations of prices and availability confronted by MSC, the bunkering schedule is required to be reviewed continuously as data on current costs and availability of fuel are provided by the area commanders. The ability to change bunkering plans represents a highly visible opportunity to cut costs. On the day-to-day decision making level the other major fuel opportunity relates to the flexibility of altering SOA's. Impacts on fuel cost by SOA is reflected in Table II-I which should be used for relational purposes only as fuel at the current average price of \$26/BBL is not reflected on this 1979 Table [Ref. 5]. When the Tri-Coast and MID-PAC operations were both functioning, their optimum SOA was approximately 16 knots. When the Combined Service was initially operated with six ships, it was at a recommended SOA of 15.5 to 16 knots. Now that the CS is down to five ships, the SOA is closer to 18 knots. Note also that overcapacity is no longer a problem.

3. External Organizational Interfaces

Because MSC in general and the Combined Service manager in particular, control only the sea leg of any cargo movement, there are major organizational interfaces required in both planning and executing to ensure the movement satisfactorily meets shipper needs. MSCPAC, as the CS manager,

TABLE II-I

RELATIONSHIP OF SOA TO FUEL COST FOR A TYPICAL C-4 SHIP*

	FUEL COST \$/BBL	19.00	19.50	20.00	20.50	21.00	EX	
							21.50	
INPORT \$/HR	291.83	293.46	295.08	296.71	298.33		299.96	
SPEED OF ADVANCE				(COST PER HOUR)				
14.0	48.02	48.57	49.11	49.66	50.21		50.75	51.84
15.0	45.38	45.92	46.47	47.01	47.55		48.10	49.18
15.5	44.38	44.93	45.48	46.03	46.57		47.12	48.22
16.0	43.58	44.13	44.69	45.24	45.80		46.35	47.46
16.5	42.94	43.51	44.07	44.64	45.20		45.77	46.90
17.0	42.46	43.04	43.62	44.20	44.78		45.36	46.51
17.2	42.32	42.90	43.48	44.07	44.65		45.23	46.40
17.5	42.44	43.04	43.63	44.22	44.82		45.41	46.60
18.0	42.81	43.42	44.03	44.64	45.25		45.86	47.09
18.5	43.27	43.90	44.53	45.16	45.79		46.42	47.68
19.0	43.81	44.46	45.12	45.77	46.42		47.07	48.37
19.5	44.43	45.11	45.78	46.45	47.13		47.80	49.15
20.0	45.12	45.82	46.52	47.22	47.91		48.61	50.01
20.5	45.88	46.60	47.33	48.05	48.77		49.50	50.94
20.9	46.53	47.27	48.02	48.76	49.51		50.25	51.74

*The table was designed to be read by first selecting the known cost of fuel, progressing vertically down the appropriate column to the minimum cost per hour, then read horizontally the optimum speed of advance. Similar charts could be made for any ship given its operating characteristics.

works closely with MSCLANT, MSCGULF, and MSCFE who have operational control of CS ships in their respective areas.

The primary CS management interface outside MSC is with the Military Traffic Management Command (MTMC) or, more specifically, with two of its West Coast subcommands, the Military Export Cargo Offering and Booking Office (MECOBO) and the Military Ocean Terminal, Bay Area (MOTBA). MSCPAC used to perform all of the booking functions for the controlled fleet (including CS). On 1 October 1981 the booking function was transferred to MECOBO along with seventeen personnel and their ceiling points. MSCPAC still receives breakbulk cargo offerings from MECOBO and assigns CS shipping assets. This function is performed with in-house personnel who used to be colocated with the personnel performing the related booking functions assumed by MECOBO.

MOTBA performs all terminal functions related to cargo including receiving, storing, staging, and providing stevedoring services in loading and discharging. An additional function of considerable importance to the CS as a breakbulk operation is the development of prestow plans, Specified expenses are paid in accordance with an Inter-service Support Agreement between MTMC and MSC.

Another major external interface is with the steamship company and its agents worldwide. As will be

discussed later, an MSC time charter is for a fully operational and crewed ship. MSCPAC fixes the itinerary and manifests cargo and then lets the steamship company operate as it sees fit within those constraints. If there are repair parts needed or crew to be rotated, that is all handled by the shipping agents.

Last but not least are the periodic interfaces with the shipper services themselves. Army, Navy, Air Force, and Marine Corps logistics personnel as well as other DoD shippers interested in CS service frequently contact MSCPAC concerning schedules, cargo sizing issues, or cargo handling recommendations.

4. Reporting Systems and ADP Support

The collection, recording and processing of CS related data are vital facets of MSCPAC's responsibility in the management of this MSC cargo lift operation. The data which are collected provide necessary inputs not only for improvement analysis, but also for cargo lift projections, financial projections, and general planning functions as well. Data are received from the CS ships themselves, MSC offices throughout the world, MTMC offices, COMSC, and numerous other points of contact.

These data are input into several manual and automated systems for report generation and historical data collection purposes. Port performance data are collected,

compiled into Port Performance reports and utilized in-house to closely monitor port costs. A Cargo Space Available Report is transmitted to the subsequent port of call of a departing ship by the MSC loading activity. A model known as PROFORMA accepts data concerning loading cargo, booked cargo, and voyage data and generates reports that are consequently used in comparative analysis of ship voyages. These PROFORMA data are submitted upon completion of loading at the last port in a voyage segment or five days prior to the end of the month. The Cargo Ship Location, Status, and Utilization Subsystem (CALSTAT) is probably the most extensive management oriented system. This system provides information in standardized report format concerning current ship arrivals, departures, and fuel consumption. It also stores in easily retrievable formats historical controlled fleet usage data. Cargo load and discharge statistics are taken from both PROFORMA and CALQAT reports. Data on port and at-sea costs, port charges, and bunkering operations are extracted from the CS unique Port Performance Reports.

Various other pieces of information are extracted from the Cargo Space Available Reports, Departure/Arrival/Movement Reports, billing tables, and other internal documents and recombined into periodic management reports. Some of these include graphical displays of fuel consumption at various speeds for hullcleaning requirement studies,

revenue/cost studies based on cargo loads/discharges and billing tables, graphical port charge distribution displays, and cargo flow analysis for various port combinations. Numerous types of historical information are stored and can be displayed in formats suitable to current emphasis or requirements.

Automated data processing (ADP) equipment available to MSCPAC runs from small to large with the former spectrum exemplified by two hand held programmable calculators, the TI-58C and TI-59, which are used to tabulate port and at-sea costs with a locally developed program. A self contained Tektronics microcomputer located at MSCPAC is used to run a locally developed fuel consumption curve program.

A major command ADP asset is a time sharing operation with the CDC 6700 located at the Naval Surface Weapon Center, Dalgren, Virginia. This system has been used since September 1972 to run the PROFORMA model to obtain ship status reports, model voyage studies and fuel consumption projections. The turn around time for a PROFORMA report from keyed input to hard copy output is approximately 30 minutes and consequently is an effective tool in daily decision making. PROFORMA Voyage Analysis Summaries are useful to personnel responsible for planning and budgeting.

MSC and MTMC ADP departments are colocated at MTMC Headquarters in Falls Church, VA. A shared Honeywell mainframe is used to run, among other things, the CALSTAT programs. This MSC command-wide system operates in an interactive, real-time mode and accepts data from MSCPAC via a Data Point 8200 "dumb" terminal and a Data Point 8600 "smart" terminal. Various software packages are also available that support MSC in-house data display requirements. A Data Point microcomputer at MSCPAC, Oakland receives the local CALSTAT data which are output to tape and then transmitted via the SYCOR computer link to Falls Church. A direct link is currently being investigated. MSCLANT and MSCPAC are hardwired to the Honeywell via its SYCOR interface but overseas area commands must transmit their data via the AUTODIN network directly to the Virginia SYCOR unit. Because this is a batch processing system, a full input-to-output cycle for MSCPAC takes approximately 33 hours, thus reducing its utility as a day-to-day management tool. The Unit Billing System is also run on the Honeywell and it correlates terminal-inputted confirmed booked data with ocean cargo manifest tapes.

An ongoing project that will consolidate and/or upgrade existing ADP systems is the MSC Automated Information System Architecture (AISA) which is being developed incrementally with some subsystems completed and others not planned to be operational until FY 1989.

D. OPERATIONS

1. Ships, Captain, Crew

The current CS operation consists of five C-4 time charter ships including:

SS MALLOY LYKES (C-4),

SS MASON LYKES (C-4),

SS AMERICAN MONARCH (C-4),

SS ELIZABETH LYKES (C-4), and

SS DAWN (C-4).

All are in various stages of multi-year contracts to MSC averaging approximately \$16,500 per day base charter hire. Descriptive data relative to the current CS fleet are represented in Table II-II. "C-4" is simply a designation for a cargo ship 500-600 feet in length. The ideal situation would be to consistently operate the same class ship in the CS. However, this has proven impossible and, in fact, ships are rotated frequently to meet operational requirements within the CS and MSC controlled fleet in general. The LYKES ships being used are of the Clipper Class.

The time charter approach to maintaining strength in the MSC controlled fleet is one of the more flexible arrangements. These contracts can be for one or more years with or without options for follow-on years. Normally contracts are written for two years with options to five years thus stabilizing short and long term planning.

TABLE II-II
CS SHIP CHARACTERISTICS
(MSC Ship Register - January 1983)

	<u>CLASSI- FICATION</u>	<u>YEAR BUILT</u>	<u>GROSS TONS</u>	<u>DWT</u>	<u>LENGTH</u>	<u>BREADTH</u>	<u>DRAFT</u>	<u>SPEED (knots)</u>
ELIZABETH LYKES	AK	1966	10954	14662	540'	76'	32'	20.0
MASON LYKES	AK	1966	10723	14662	540'	76'	33'	20.0
MALLORY LYKES	AK	1966	10718	14662	540'	76'	32'	20.0
AMERICAN MONARCH	AK	1969	13053	13074	579'	82'	31'	23.0
DAWN	AK	1963	11309	12728	552'	75'	31'	20.0

Although, the average daily base charter hire for CS ships is \$16,500, actual operating costs including fuel and port charges increase the cost to approximately \$24,000 per day. Reduced operating status costs are substantially lower because crews can be reduced at least two-thirds to 5-10 persons.

The typical crew on a Clipper Class ship is displayed in Table II-III. This crew is hired by the steamship company through their respective unions. Their primary point of contact ashore for personal and professional matters is the steamship agent.

2. Route Structure

The CS route structure is designed to meet the needs of the shipper services with a consistent itinerary and consistent port call frequency. It was felt that this type of service would generate more business (revenues) than a tramp operation and at the same time provide better service. The CS was reduced from six ships to five in July 1982 to decrease operational costs, reduce ROS frequencies and costs, and increase utilization of the remaining ships. Current ports of call are listed in most common order in Table II-IV. Certain low volume ports such as Midway, Wake, Johnston Island, and Kwajalein are visited on a periodic, as needed basis. An average voyage lasts 80 days and the average SOA for the past year increased from 15.5 to 17.5. The ships are routed West Coast-Far East-East/Gulf Coasts

TABLE II-III

MANNING OF A TYPICAL CLIPPER CLASS SHIP

1	Master
1	Chief Officer
1	2nd Officer
2	3rd Officer
1	Radioman
1	Boatswain Mate
1	Deck Utilityman
6	Able Seaman
3	Ordinary Seaman
1	Chief Engineer
2	1st Assistant Engineer
1	2nd Assistant Engineer
2	3rd Assistant Engineer
1	Electrician
1	Assistant Electrician
3	Deck Engine Mechanic
2	Wiper
1	Steward
1	Chief Cook
1	Cook/Baker
5	Utilityman

38	TOTAL
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TABLE II-IV

TYPICAL ROUTE STRUCTURE FOR THE COMBINED SERVICE

Tacoma
Oakland
Port Hueneme
San Diego
Pearl Harbor
Midway
Guam
Subic Bay
Naha
Pusan
Yokohama
Pearl Harbor
Oakland
San Diego
Canal Zone
Charleston
Norfolk
Bayonne
New Orleans
Mobile
Canal Zone
Pearl Harbor
Yokohama
Pusan
Naha
Subic Bay
Guam
Pearl Harbor
Oakland
Tacoma

then East/Gulf Coasts-Far East-West Coast. The outbound legs (to the Far East) are the best utilized, with the inbound leg less utilized and the intra-area (up/down/ between coasts) being utilized the least. FY82 summary data exemplifies this fact with a total of 185,509 measurement tons (MT) carried outbound, 89,623 MT intra-area, and 110,061 MT inbound. Because the breakbulk billing rates did not compensate for the cost of the Combined Service, there was an estimated \$408,318 loss per voyage [Ref. 6]. Table II-V gives a good overview of voyage history with related losses.

3. The Financial Structure

The Military Sealift Command operates as part of the Navy Industrial Fund (NIF). An industrial fund is a working-capital fund providing working capital for industrial-commercial type activities and to control and account effectively for the cost of these Department sponsored programs. MSA is included as one of the eight activities within the NIF because it meets the criterion of being an industrial or commercial type activity engaged in producing goods or providing services, in response to requirements of users and central management organizations, that are common within and among DoD components.

The budget office at MSC headquarters (M-51) is responsible for developing the billing rate tables which are currently updated annually. Because of the rate

TABLE II-V

TRI-COAST AND COMBINED SERVICE FY 79 - 82 COMPARISON

	FIRST SIX MONTHS FY 79			LAST SIX MONTHS FY 79			
	TRI-COAST			COMBINED SERVICE			
	WC-MID-PAC	PAR EAST	AVERAGE	EC-FE-WC	WC-FE-EC	AVERAGE	
NO. OF VOYAGES	6	7	13	6	4	10	
AVERAGE VOYAGE LENGTH DAYS	81	109	96	89	110	97	
AVERAGE PORT CALLS	-	-	-	16	21		
UTILIZATION % OUTBOUND	72%	60%	65%	65%	85%	73%	
% INTRA AREA	32%	28%	30%	38%	48%	43%	
% INBOUND	45%	67%	53%	58%	68%	63%	
MTS (AVERAGES PER VOYAGE)	15409	15915	15681	16753	20589	18410	
STEAMED MILEAGE	17563	28634	23524	22198	23149	22673	
RATIO STEAMED: MTM MILEAGE	4.8:1	4.7:1	4.7:1	4.1:1	4.8:1	4.4:1	
COST (000) MTM	\$21.38	\$17.27	\$19.93	\$15.01	\$17.00	\$15.84	
RATIO OF INCOME TO COST-MTM	.65:1	.63:1	.62:1	.80:1	.72:1	.76:1	
MT/DAY LIFTED	190	146	163	189	212	190	
ESTIMATED DAILY COST	\$14558	\$15281	\$14947	\$15429	\$15464	\$15443	
AVERAGE VOYAGE PROFIT (LOSS)\$	(\$377,004)	(\$612,766)	(\$503,592)	(\$227,978)	(\$465,845)	(\$353,124)	

Average broken stowage factor - .4

TABLE II-V (Continued)

	FY 80			FY 81			FY 82		
	EC-FE-WC	WC-FE-EC	AVERAGE	EC-FE-WC	WC-FE-EC	AVERAGE	EC-FE-WC	WC-FE-EC	AVERAGE
NO. OF VOYAGES	12	10	22	12	12	24	11	11	22
AVERAGE VOYAGE LENGTH DAYS	86	99	92	80	95	87	88	98	93
AVERAGE PORT CALLS	15	21		15	21		16	21	
UTILIZATION									
% OUTBOUND	80%	83%	82%	70%	75%	72%	72%	88%	80%
% INTRA AREA	31%	48%	40%	23%	37%	30%	41%	37%	39%
% INBOUND	46%	70%	57%	43%	60%	52%	36%	55%	47%
MTS (AVERAGES PER VOYAGE)	15888	20043	17777	13949	18373	16161	16071	18947	17509
STEAMED MILEAGE	21971	23330	22569	21778	22612	22195	22209	22812	22511
RATIO STEAMED: MTM MILEAGE	3.9:1	5.2:1	4.5:1	3.2:1	5.3:1	4.3:1	4.1:1	5.0:1	4.5:1
COST (000) MTM	\$20.82	\$22.10	\$21.40	\$22.54	\$24.10	\$23.33	\$29.13	\$33.09	\$31.11
RATIO OF INCOME TO COST-MTM	.805:1	.748:1	.779:1	.830:1	.773:1	.801:1	.853:1	.808:1	.831:1
MT/DAY LIFTED	185	203	193	175	193	184	182	193	188
ESTIMATED DAILY COST	\$22262	\$20228	\$21337	\$23623	\$22232	\$22927	\$28090	\$27844	\$27967
AVERAGE VOYAGE PROFIT (LOSS)\$	(\$372,262)	(\$482,190)	(\$422,229)	(\$301,671)	(\$507,002)	(\$404,336)	(\$310,983)	(\$505,714)	(\$408,318)
TOTAL MTS	200465	191013	391478	167436	218185	385621	176782	208421	385203
OUTBOUND	82716	95917	178633	85652	87780	163432	83663	102646	185509
INTRA AREA	47970	38524	86494	29159	46088	75247	46903	42729	89623
INBOUND	69779	56572	126351	52625	74317	126942	47015	63046	110061

Average Broken Stowage Factor - .4

stabilization policy required by the Office of the Secretary of Defense (OSD), rates are not particularly representative of projected costs. If losses are incurred within the overall MSC budget in one fiscal year, the NIF absorbs those losses and the rate structure is altered to "pay back" the fund the following year so that Defense appropriations don't require major additions one year and deletions the next. There is generally an 18 month lag in these rate structure accommodations.

Since MSC does charge the shipper services, i.e., the Navy, Marine Corps, etc., for its CS services, it is appropriate in this section to briefly describe the billing process supported by the computerized Unit Level Billing System. Manifests are prepared when cargo is loaded in accordance with Military Standard Transportation and Movement Procedures (MILSTAMP) direction and forwarded as expeditiously as possible to the discharge port. At the same time, a copy is sent to the M-53 the statistical analysis branch, at MSC headquarters, for preparation of a detailed substantiation for billing which, in turn, is passed to M-52, the accounting branch. The accounting branch actually prepares the bills sent to the shipper services. MSC area commands are sent documentation displaying billing data and they verify it against their in-house records of cargo loading and discharging obtained from the MSC offices worldwide.

4. Recurring Issues

The purpose of this section is to give an overview of historical issues and/or problem areas. These problem areas are categorized into four major areas with short discussions concerning each. Chapter V will look again at some of these issues and others from a more current perspective.

The Tri-Coast operations initially, and the Combined Service later, resulted in per voyage losses of \$150,000 to \$500,000. Although the CS was generally expected to lose money, pressure had always been applied to keep the losses to a minimum. The problem had continually been a complex one due to a large number of variables and to other factors less subject to MSC control. Several of the more significant factors were:

- a. a large breakbulk service was anachronistic in terms of cost effectiveness;
- b. readiness requirements, which established the need to employ breakbulk ships productively in peacetime, were ill-defined;
- c. responsibility for terminal operations and ship operation was split between MTMC and MSC; and
- d. current rate setting mechanisms and PROFORMA algorithms made it:

(1) impossible to adjust income to meet expenses in a timely manner;

(2) difficult to establish rate incentives to increase cargo offerings; and

(3) impossible to consider "dead" costs in voyage management or more specifically, those costs that were associated with the ancillary functions of the operation such as readiness.

The first issue referred to the fact that breakbulk ships were being replaced rapidly by specialized dry cargo ships with substantial operational economies of scale. These newer designs include container ships, Oil/Bulk/Ore (OBO) carriers, combination ships, Roll-On/Roll-Off (RO/RO), Lighter Aboard Ship (LASH), and Sea Barge (SEABEE) ships. The next chapter will cover in more depth the unrelenting decrease in U.S. Flag and worldwide breakbulk ships as world shipping continues to modernize to take advantage of new cargo transportation and handling efficiencies.

The second issue concerned readiness objectives, to be discussed at length later in this paper. Readiness had always been a major justification for a MSC controlled fleet breakbulk shipping operation. Unfortunately, peacetime breakbulk handling requirements necessitated a quite different ship configuration than would be necessary for a wartime scenario. For example, the early Tri-Coast cargo ship characteristics contributed directly to the losses being experienced because the ships were not well suited to the requirements of a multiple-port breakbulk service that

required the carrying of vehicles, container unsuitable cargo, and some containers. Experience proved that Challenger Class ships in this type of service would rarely, if ever, be able to carry more than 40-45 percent (with broken stowage, 67-75 percent) of their cube "capacity." It had been observed that if an ideal ship were designed for the CS, it would resemble the American Hawaiian S.S. Company C-4 once used in the intercoastal trade (i.e., small hatches relative to deck area, many shallow tween decks, engines aft to preserve parallel midbody area for cargo) [Ref. 7]. The Challenger Class initially in Tri-Coast use, on the other hand, had huge hatches, high tween decks, little deck area, engines midships, and vertical ballast tanks that further reduced deck area in the holds. Problems of overstorage and the resultant rehandling costs seemed to be unavoidable when these ships were used for a multiple port environment with the type of cargo being offered. It should be noted that in a mobilization scenario where all the cargo would be going to one location, these ships would function quite satisfactorily. In fact, they are now part of the National Defense Reserve Fleet (NDRF).

The Clipper Class ship that now predominates in the CS fleet, is somewhat more appropriately designed with four large holds forward of the machinery spaces and one large and one small hold astern. The upper and lower tween decks are still rather high ranging from nine feet to sixteen

feet. The forward twin hatches average 27 feet by 40 feet with some exposed deck area while practically the entire aft deck is covered with hatches.

The third factor that made and continues to make controlling costs difficult is the lack of control over booking cargo and terminal operations, both currently performed or coordinated with MTMC. Ship port calls are based on cargo offerings which in turn are based on cargo routing. MTMC routes cargo based solely on their expenses and MSC shipping rates, not on MSC's overall expenses. Additionally, there appears to be a contingency requirement to keep at least three West Coast Defense Transportation System (DTS) terminals operational (Tacoma, Oakland, and San Diego) and, consequently, productively utilized. This results in some inefficiencies from a MSC perspective [Ref. 8]. An interesting comparison was made showing how the military differed in its management philosophy from its civilian counterparts. Table II-VI displays these differences with the consensus from the commercial breakbulk carriers that the government does not conduct its CS operations the "right" way [Ref. 10].

The fourth factor relates to inefficiencies in the current rate setting mechanisms that are too inflexible from a management perspective. MSCPAC is held responsible for the basic formula: $\text{Profit}/(\text{Loss}) = \text{Revenue} - \text{Cost}$. In reality, however, the command has little to no control over

TABLE II-VI

GOVERNMENT VS COMMERCIAL OPERATIONAL RESPONSIBILITY [Ref. 9]

<u>GOVERNMENT</u>			<u>COMMERCIAL</u>	
<u>Shipper* (MTMC)</u>	<u>Carrier (MSC)</u>	<u>Shipper</u>	<u>Carrier</u>	
Offers Cargo	Books (CS only)	Offers Cargo	Books	
Pre-Plans Stow	Approves (for stability/trim)	-	Pre-Plans	
Receives Cargo at Terminal	-	-	Receives Cargo	
Operates Terminal	-	-	Operates Terminal	
Supervises Stowage	-	-	Supervises Stowage	
Determines In-Port Time	Coordinates	-	Establishes In-Port Time	
Loads Cargo	-	-	Loads Cargo	
-	Sails Ship	-	Sails Ship	
Issues All Shipping Documents	-	-	Issues Documents	

*Acting as transportation coordinator for all the shipper services.

revenue (billing rates) and only incomplete control over costs. The present rate structure and shipping cost information causes cargo to flow to containers because the minimal handling cost is reflected in lower overall rates. Another example of rate inflexibility can be related to the low utilization rates due to lack of suitable cargo for "flooring off." If flooring cargo (i.e., canned or some other small packaged goods) could be attracted by "loss leader" rates, overall voyage costs could be reduced by generating marginal income through use of currently unusable space.

Another complaint concerned the management problem of projecting and controlling CS "losses" when no one was willing to state as a MSC budget line the "cost" of maintaining specific cargo ships in the controlled fleet to meet contingency requirements and other mission needs. This was a real cost, and, without any firm direction, could only be equated with the average historical voyage loss. Along similar lines, what was the cost of providing for service where no commercial service is available? What was the cost of providing for heavy lift or oversized high priority items that could not be accommodated in a timely manner by commercial operators? In other words, it would have been valuable for MSCPAC to know what portion of their losses was acceptable and what portion was not. To help resolve this

problem a "readiness" budget line is planned for the FY 85 NIF budget [Ref. 10].

Delays in financial feedback or inappropriate feedback were also recurring problems. Consistent complaints were noted concerning the heavy reporting requirements to support voyage analyses. Even after waiting some time for the receipt of the analyses, it was felt they were not adequately highlighted to show specific enough costs during a voyage to enable an area commander to draw conclusions and make better operational decisions.

E. SUMMARY

The purpose of this chapter was to introduce the subject of the Combined Service, explain its antecedents, and briefly describe how it is managed and operated today. This perspective, including initial implementation issues and early operational problems, should be valuable because it helps provide a framework to evaluate later policy decisions and operational changes.

The following two chapters will discuss in general the external environment that has impacted military breakbulk shipping. Chapter V will then return and relate the Combined Service to that environment.

III. U.S. FLAG BREAKBULK SHIPPING AS PART OF THE INDUSTRIAL BASE: EXPECTATIONS VS REALITY

A. BACKGROUND AND HISTORY

One of the most important factors to be considered in measuring the economic capability of any nation is its ability to carry on foreign commerce and international trade. Throughout history, the most powerful and influential governments have been those which have developed their trade potentials and fostered policies designed to improve their national position. One would think that the United States, as the world's greatest trading nation, would consequently have one of the world's greatest merchant fleets. A brief historical overview of government support (or non-support) of the U.S. Merchant Marine, that up until the near past consisted primarily of breakbulk and tanker assets can help explain this apparent disjunction. This discussion is supported by Table III-I which shows increasing U.S. oceanborne foreign trade tonnage coupled with decreasing market share.

This country was colonized and maintained as a nation by using sea transportation as the basic means of trade and communication. However, as early as 1789, the need for government assistance to the American merchant marine was recognized in the form of a discount on tariff duties for

TABLE III-I

U.S. OCEANBORNE FOREIGN TRADE/COMMERCIAL CARGO CARRIED, 1947-1981 [Ref. 11:48]

TONNAGE (Millions)

CALENDAR YEAR	1947	1948	1949	1950	1951	1952	1953	1954	1955
TOTAL TONS	142.2	139.0	133.2	117.5	193.1	187.9	178.0	177.0	226.2
U.S. FLAG TONS	81.9	67.0	60.3	49.7	76.8	64.4	51.7	48.7	53.1
PERCENT OF TOTAL	57.6	48.2	45.2	42.3	39.8	34.3	29.1	27.5	23.5
CALENDAR YEAR	1956	1957	1958	1959	1960	1961	1962	1963	1964
TOTAL TONS	260.1	289.3	253.3	267.0	277.9	272.4	296.8	311.6	332.8
U.S. FLAG TONS	53.9	50.8	30.9	27.1	31.0	26.3	29.6	28.5	30.5
PERCENT OF TOTAL	20.7	17.6	12.2	10.2	11.1	9.7	10.0	9.2	9.2
CALENDAR YEAR	1965	1966	1967	1968	1969	1970	1971	1972	1973
TOTAL TONS	371.3	392.3	387.6	418.6	427.5	473.2	457.4	513.6	631.6
U.S. FLAG TONS	27.7	26.2	20.5	25.0	19.8	25.2	24.4	23.8	39.9
PERCENT OF TOTAL	7.5	6.7	5.3	6.0	4.6	5.3	5.3	4.6	6.3
CALENDAR YEAR	1974	1975	1976	1977	1978	1979	1980	1981	
TOTAL TONS	628.9	615.6	698.8	775.3	777.0	823.1	772.2	760.0	
U.S. FLAG TONS	40.9	31.4	33.8	34.8	31.9	35.0	28.2	34.2	
PERCENT OF TOTAL	6.5	5.1	4.8	4.5	4.1	4.2	3.7	4.5	

goods imported in American-flag vessels. As a result, the period 1789-1817 saw the U.S. grow to become the second largest maritime nation, with Britain keeping the number one position. Cabotage laws were instituted in 1817 that reserved domestic trade to U.S. flag ships. Another attempt at promoting U.S. foreign shipping was the mail subsidy program during 1847-1857. Unfortunately, because of management inconsistencies and cries of "favoritism," these subsidies proved ineffectual and there began a slow decline of the maritime fleet.

The Civil War period was disastrous for the merchant fleet during which a large portion was destroyed. At this all time low, the mail subsidy concept was reinstituted and operated for thirteen years with little, if any, practical effect. The Ocean Mail Act of 1891 was a real attempt at a reformed approach, but it was too little, too late. By 1900, only 9 percent of U.S. foreign trade was carried in U.S. flag ships [Ref. 12:44]. The mail subsidy was replaced with a defense subsidy in the 1904 Defense Cargo Preference Act. This act basically required all defense cargo to be shipped in U.S. flag vessels unless they were unavailable or unless the President found the foreign rates charged by the available vessels to be excessive or otherwise unreasonable. This promoted some expansion, but, as the sounds of war increased across the Atlantic, it became obvious more direct

efforts were needed. The Shipping Act of 1916 was an emergency measure to permit production of over 2300 ships for World War I.

The first attempt at a comprehensive overhaul of the merchant marine and the first definitive statement of government policy concerning aid was in the Merchant Marine Act of 1920 which stated:

"It is necessary for the national defense and for the proper growth of its foreign and domestic commerce that the United States shall have a merchant marine of the best equipped and most suitable types of vessels sufficient to carry the greater part of its commerce and serve as a naval military auxiliary in time of war or national emergency...and it is hereby declared to be the policy of the United States to do whatever may be necessary to develop and encourage the maintenance of such a merchant marine."

In 1928, in an attempt to correct some of the weaknesses of the 1920 Act and do something about the obsolescence problem created by the then-excess World War I fleet, the Merchant Marine Act of 1928 was passed. Its primary emphasis on broadening the mail subsidy program had little effect on construction of new ships and the merchant fleet continued to decline.

By 1936, it was again obvious that the U.S. Merchant Marine, like most U.S. post-depression industries, was in terrible shape and minor tweaks to the system were just not going to work. The positive legislative atmosphere with its emphasis on getting the country back on its feet allowed the passage of the Merchant Marine Act of 1936. This Act formed

the legislative foundation upon which today's merchant fleet is based. It, incidentally, eliminated the ineffective mail subsidy program and established the first independent agency to handle maritime affairs, the Maritime Commission. The Act concentrated on the U.S. foreign trade provided by liner vessels and promoted U.S. shipbuilding and U.S. flag operations by very specific Construction Differential Subsidies (CDS) and Operating Differential Subsidies (ODS). The ODS was further tied to a Capital Reserve Fund (CRF) oriented toward replacement of ships as they reached obsolescence. It should be noted that the domestic trade was ignored in this Act as it was felt the much earlier Jones Act, reserving all domestic trade for U.S. flag vessels, was sufficient to promote the domestic trade.

There had hardly been time to judge the effectiveness of the Act of 1936 when World War II arrived with its attendant confusions. The War Shipping Administration was created in 1941 to oversee the building of approximately 5600 merchant ships. The fleet had once again reached healthy proportions only to restart its decline at the end of World War II. To dispose of the large number of excess ships in the U.S. inventory and to support the rebuilding of foreign fleets, the Merchant Ship Sales Act of 1946 was passed. In addition to managing ship sales, it also created the National Defense Reserve Fleet (NDRF) which retained and maintained, initially, 1421 merchant type ships for national defense purposes.

Table III-II is useful in showing the gradual but relentless decline of the NDRF. The largest percentage of ships in the NDRF at that time were versatile and flexible conventional general cargo vessels that carried their own cargo handling gear and were usable under almost any circumstances. As a result, the period of 1947-1950 saw little, if any, cargo ship construction and a general decline in U.S. foreign trade although there was considerable activity in Europe and the emerging countries as they bolstered their war ruined economies. The Reorganization Act of 1950 abolished the independent Maritime Commission and transferred its duties to the Maritime Administration (MARAD) housed within the Department of Commerce where it remained until 1981 when MARAD was switched to the Department of Transportation.

War again acted as the impetus for the expansion of the merchant fleet. The Defense Production Act of 1950 established the National Shipping Authority under MARAD jurisdiction. The merchant marine assumed a major role in transportation of goods in the Korean War effort. Approximately 540 NDRF ships were reactivated and although old, the active fleet reached major proportions again. The 1954 Cargo Preference Act modified the 1904 Preference Act to include the additional restriction that at least 50 percent of the defense cargoes must be shipped on privately owned U.S. Flag vessels. This appeared to be a ploy to ensure the Military Sealift Command (MSC) did not move heavily into the

TABLE III-II

NATIONAL DEFENSE RESERVE FLEET 1945-1982 [Ref. 11:48]

FISCAL YEAR	SHIPS	FISCAL YEAR	SHIPS
1945	5	1964	1739
1946	1421	1965	1594
1947	1204	1966	1327
1948	1675	1967	1152
1949	1934	1968	1062
1950	2277	1969	1017
1951	1767	1970	1027
1952	1853	1971	860
1953	1932	1972	673
1954	2067	1973	541
1955	2068	1974	487
1956	2061	1975	419
1957	1889	1976	348
1958	2074	1977	333
1959	2060	1978	306
1950-60	2000	1979	317
1961	1923	1980	320
1962	1862	1981	317
1963	1819	1982	304

defense dry cargo business using the ships it had reactivated for the Korean sealift. Nonetheless, the period of 1954-1962 was again one of decline for the merchant marine and significantly, both commercial and NDRF ships were beginning to reach block obsolescence as most had been built to support World War II requirements.

The 1960's saw the demand for merchant shipping again rise to meet the heavy shipping requirements of the Vietnam War. In the FY 1965 Annual Report of the Maritime Administration, there were 1594 ships in the reserve fleet of which 960 were under preservation. One hundred seventy-six (176) ships were reactivated. The aging reserve ships performed surprisingly well even though there are interesting tales of retired ship's engineers being recalled to active service because they were the only people left who knew how to machine parts for these ships as the machinery regularly broke down. Due to obsolescence and attrition from the NDRF fleet over the years, the U.S. required the services of over 33 shipping companies which included 73 foreign flag vessels to meet the Vietnam lift requirements. These 73 ships represented almost 25 percent of all the foreign flag ships serving U.S. commerce through non-liner trade at the time [Ref. 13:2-14]. In other words, a substantial portion of worldwide shipping assets were needed to support the U.S. military requirement in Vietnam.

Figure III-1 helps display the magnitude of the Vietnam era shipping effort from a worldwide perspective.

The United States entered the seventies feeling that without an immediate and massive fleet renewal program for the merchant marine the U.S. shipping industry could cease to be a world player and defense needs in time of emergency would not be met. The Merchant Marine Act of 1970 attempted to rectify some of the more glaring problems of the 1936 Act. It is generally credited with: (1) a substantial increase in ship production; (2) fleet modernization and increased efficiency in ship building and operation (and hence increased effectiveness of ODS and CDS funds); (3) increased attention to the development of domestic water transportation; and (4) recognition of the importance of bulk trades. However, most of these improvements had little effect on the breakbulk fleet.

Of the 344 ships in the NDPF in December 1976, only 139 ships were general cargo ships. The remaining ships were Navy-owned non-combatant ships not available for general waterborne transport. This group of Navy ships was comprised of mine-sweepers, tugs, and other miscellaneous ship types which were not capable of carrying military cargoes. One hundred thirty (130) of the general cargo ships in the NDRF at that time were VICTORY Class ships built by the government during World War II. These steel hulled freighters are propelled by steam turbines and are

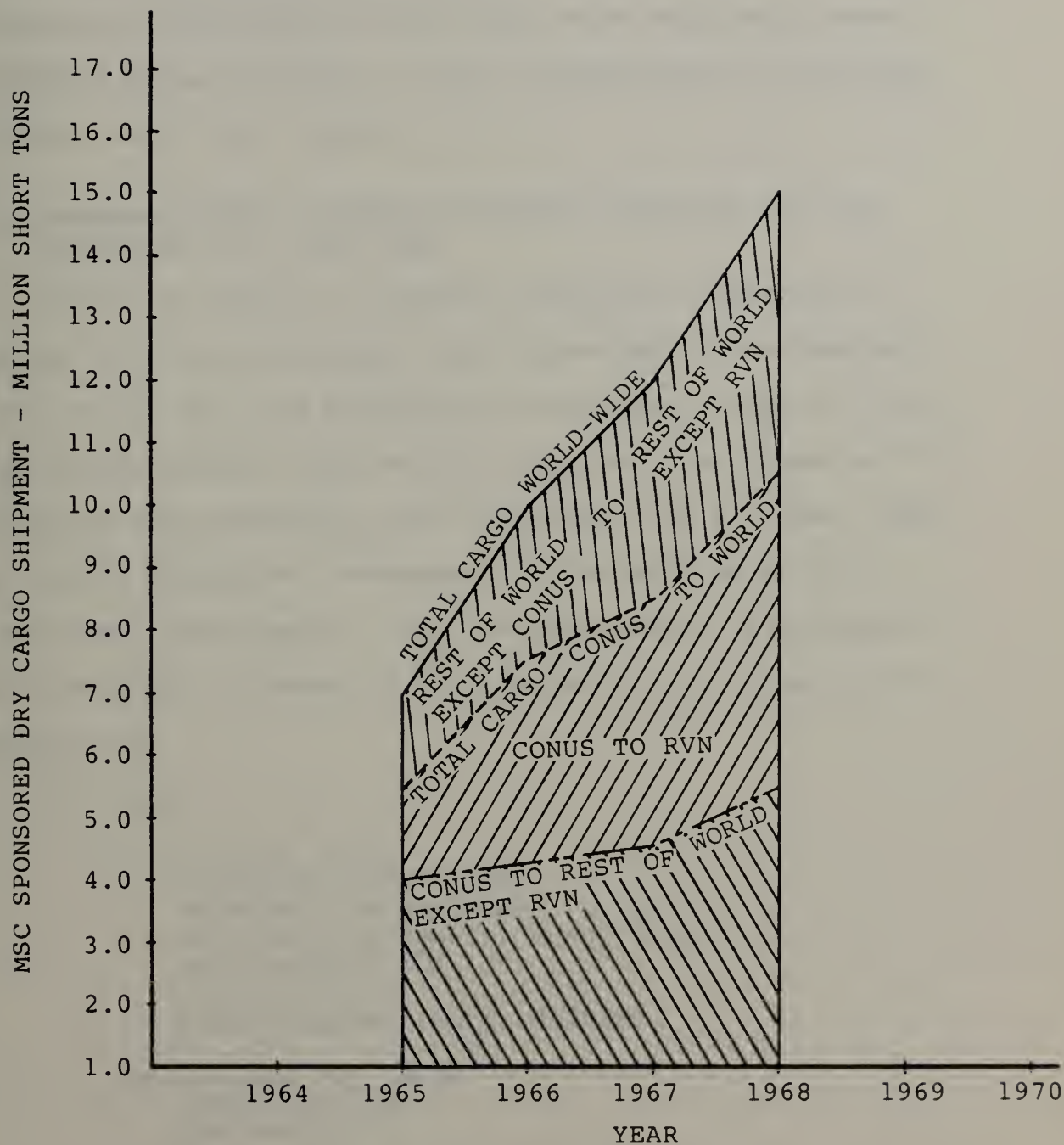


Figure III-1. Total Sealift of Department of Defense Sponsored Dry Cargo [Ref. 13:2-15]

capable of sustained sea speeds of 15 and 17 knots. The lift capacity of these ships is approximately 10,800 deadweight tons (DWT) and they are self-sustaining. The remaining nine general cargo ships were relatively newer SEATRAN ships designed to carry locomotives and railroad freight cars [Ref. 14:41].

B. GENERAL TRENDS IN WORLD BREAKBULK SHIPPING AND THE DWINDLING U.S. FLAG ROLE

Trying to focus on breakbulk shipping trends over a period of time is confused and confounded by the inconsistent use of the term breakbulk to describe a type of cargo. The terms general cargo and dry cargo are sometimes used in analyses interchangeably with breakbulk and at other times as larger categories encompassing breakbulk cargo as a functional subcategory. For the purposes of this thesis, the hierarchy of terms to be dictated by ship functions is defined as:

Dry Cargo

- Dry General Cargo
 - Breakbulk Cargo-Liner
 - Breakbulk Cargo-Tramp
 - Multipurpose General Cargo Ship
 - Roll-On/Roll-Off
 - Containership
 - Barge Caprier (LASH, SEABEE)

- Specialized Dry Cargo
 - Lumber Carrier
 - Car Ferry
 - Paper Carrier

Dry Bulk Cargo
Gypsum Carrier
Cement Carrier
Coal Carrier
Oil/Bulk/Ore Carrier
Grain Carrier
Ore Carrier

Most of the specialized and dry general cargo ships participate in the liner trade. Liners are ships that ply fixed routes on published schedules. Most of the dry bulk carriers, on the other hand, are either privately owned or operated in the tramp (or for-hire) trade. The types of cargo to be actually handled by a breakbulk ship in commercial or military employ can be broken down into two main categories. The first is general cargo consisting of packaged, crated, bagged, or otherwise contained manufactured and semi-processed goods. This "mark and count" cargo is included under the category of general cargo moved largely in liner service. Odd lot containerized and/or unitized cargo (including MSCVANS and MILVANS) falls in this category. The second type can be called miscellaneous dry cargo and is defined as raw or processed commodities is the primary type of cargo handled by general cargo ships not in the liner service. This cargo is moved in quantities too small to justify bulk movements and/or cannot be handled by bulk transfer methods. This category includes cargo generally classed as neo-bulk [Ref. 15:21].

The post World War II period is a good place to start looking at modern trends in breakbulk shipping. The years

1945 through 1950 saw little total growth in oceanborne foreign trade although, as discussed in the previous section, the other industrial nations were expanding their foreign commerce while the U.S. was slowing down. This growth in foreign-to-foreign trade was facilitated by the sale of approximately 2000 ships of various types, including 680 Liberty ships, by the U.S. government to U.S. and foreign shipping concerns. The Liberty ships were typical breakbulk ships 427 feet in length. They had a draft of 28 feet, a speed of 11 knots and lifted 10,860 DWT. These "tweendeckers" were suited to either liner or tramp trade and could carry neo-bulk, as well as, more typical "mark and count" general cargo [Ref. 16:86]. Countries whose merchant fleets had been decimated by the war and newcomers into the national flag business lured by the need for foreign currency to support their fledgling economies were the primary purchasers of these ships. The U.S. was carrying a substantial portion of her waterborne foreign trade at this time with much of the cargo generated by the liberal economic aid provided by the Marshall Plan and growing American fascination with foreign luxury goods.

This brings up the subject of what was being carried in these numerous breakbulk ships that was so necessary for U.S. commercial expansion. In looking at commercial cargoes from the viewpoint of trends, an interesting statement by the prominent economist Lester C. Thurow pointed out, "As

late as the 1960's, if international trade had been abolished, the man on the street would barely have noticed the difference. ...but by 1980, 25 percent of the economy was involved in either exports (12.9 percent of the GNP) or imports (12 percent of the GNP), compared with 10 percent in 1960. The U.S. no longer exports to buy luxuries, we export to buy necessities, including energy and strategic minerals." [Ref. 17:13].

Major categories of import and/or export dry goods include products of agriculture, forestry, fertilizer, mining, iron and steel, and manufacturing. Through the 1950's all of this was handled as breakbulk cargo. However, by the 1960's, the dry bulk carrier ton-miles were increasing at a rapid rate. This shift was primarily due to the penetration into the market of the more productive bulk carrier and related terminal handling equipment specifically designed for certain cargoes. Competition for cargo came from other transportation modes as well as foreign ocean-borne sources. The 1950's and 1960's also saw the development of rail and motor competition for the landbridge trade. Cutthroat price cutting on the part of these industries is partial explanation for why, in an expanding internal economy with an ever increasing demand for domestic transportation, the coastwise (i.e., intracoast) and intercoastal fleet had all but disappeared by the mid 1960's [Ref. 18:2].

By the early 1970's, over 80 percent of all bulkable cargoes were being carried by the pure bulk carriers with the biggest market in iron and coal [Ref. 15:16]. Most of the bulk carriers operate in the non-liner trade, and it is estimated that only 2 percent of U.S. bulk cargo is now carried by U.S. flag ships. Figure III-2 displays which flag registered ships recently carried the major portion of U.S. oceanborne trade of all types. The significance of these figures is directly related to the essentiality of these imports. Of the over four billion tons of raw materials currently required to sustain our peacetime economy, the Department of Defense lists 71 commodities as vital to our industrial security [Ref. 19:14]. Of the 68 that are imported, the Office of the Chief of Naval Operations has further identified 26 commodities considered essential imports [Ref. 13:2-1]. Rather than address each of these from a supply and demand perspective, Table III-III is included to qualify the magnitude of need and indicate potential accessibility problems based on source countries. It is estimated that U.S. imports and exports (both dry and liquid) will rise from 280 million metric tons to 464 million metric tons from 1980 through 2000 and Table III-IV gives an idea of how some of these primarily bulk commodities may be affected [Ref. 13:2-2].

Because there is very little data on strictly breakbulk cargoes, any translation of projected total increases of

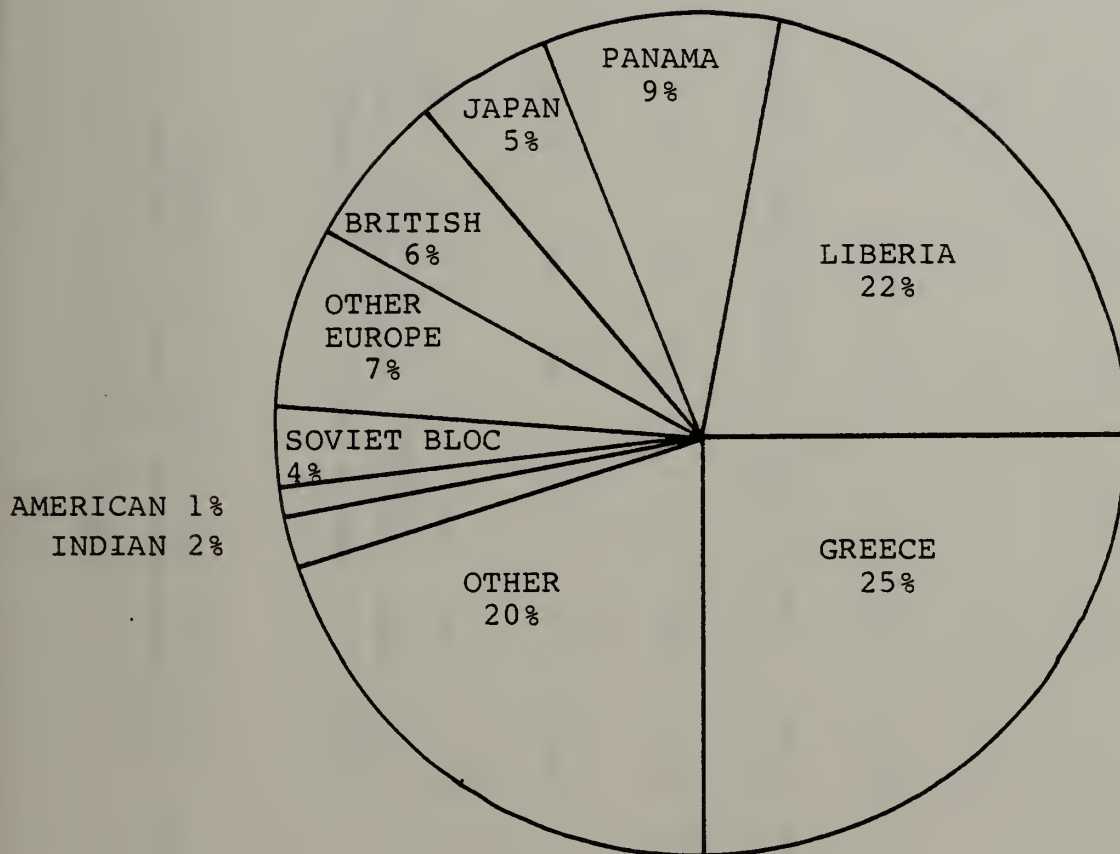


Figure III-2. Vessels Serving U.S. Economy: June 1980 - July 1981
(By number of ships) [Ref. 13:2-10]

TABLE III-III

DEMAND, SUPPLY, AND INVENTORY OF ESSENTIAL IMPORTS [Ref. 13:2-4,5,6]
in 1,000 Short Tons (1979 Data)

S.N.	Material	World Production	Demand and Supply			Inventory		Main Sources of Imports
			Demand	Domestic Production	Imports	Reserves 1980	Stockpiles	
1	Antimony	79.4 ¹⁰	11.8	NA ¹¹	7.7	NA	7.144 ¹²	Mexico, Rep. of So. Africa, Bolivia, Guatemala, Canada, Thailand, Belg-Lux.
2	Asbestos	5,617.9	617.8	102.5	553	NA	55.86 ¹³	Canada, Rep. of So. Africa, USSR, Swaziland, So. Rhodesia, United Kingdom, Finland
3	Barite or Barium Ore or Metal Spar	7,635	3,019	1,937	1,515	NA	NA	Peru, Ireland, Mexico, Morocco, Greece, Canada, Denmark
4	Bauxite & Alumina	129,800	17,298 ¹⁴	1,835 ¹⁴	15,463 ¹⁴	44,092 ⁹	25,622 ^{14,13}	Jamaica, Surinam, Guinea, Dem. Republic, Haiti, Guyana, Australia
5	Chromite	10,561	1,209	-	1,000	-	5,192 ⁷	USSR, Rep. of So. Africa, Philippines, Turkey, S. Rhodesia, Albania, Finland
6	Cobalt	31.4	8.7	-	9.7	NA	22.1 ⁷	Zaire, Belg.-Lux., Finland, Norway, Canada, United Kingdom, W. Germany
7	Columbium/ Tantalum	27.7 ¹	3.17	NA ¹¹	2.6	NA	2.8 ¹³	Brazil, Canada, Malaysia, Australia, Zaire, Nigeria, Thailand
8	Copper Primary	8,858	1,924	1,447	114 ²	101,400 ²	90	Canada, Chile, Peru, Yugoslavia, South- west Africa, Mexico, Philippines

TABLE III-III (Continued)

S.N.	Material	World Production	Demand and Supply			Inventory		Main Sources of Imports
			Demand	Domestic Production	Imports	Reserves 1980	Stockpiles	
9	Iron Ore	993,170	140,483	96,000	37,830	926,000 ⁹	11,400	Canada, Venezuela, Brazil, Liberia, Peru, Chile, Australia
10	Lead	3,897	634	584.16	490	30,985 ²	NA	Canada, Peru, Mexico, Yugoslavia, Australia, Honduras, W. Germany
11	Manganese Ore	26,963	1,372.2	27	1,327 ¹⁵	261 ⁹	NA	Brazil, Gabon, Rep. of So. Africa, Australia, Mexico, Zaire
12	Nickel	776	196	59 ³	131 ⁴	364 ²	NA	Canada, Norway, Australia, Philippines Rep. of So. Africa, So. Rhodesia, USSR
13	Potash (K ₂ O equivalent) ⁸	29,040	7,626	2,453	4,993	28,870 ²	2632	Canada, Israel, W. Germany, Congo, France, USSR, Belg.-Lux.
14	Thorium Ore (tons)	26,115	32	NA	NA	NA	NA	Malaysia, Thailand
15	Tin	282	69	28.7 ³	54.5 ⁴	NA	NA	Malaysia, Thailand, Bolivia, China (M'Ind)
16	Titanium Concentrates	4,681.4 ¹	NA	704	NA	NA	NA	Indonesia, Brazil, United Kingdom
17	Tungsten	50.8 ²	10.8	3.3	5.7	330,690 ²	0.8	Australia, Canada, India, Sri Lanka
18	Uranium (U ₂ O ₅) ¹	50 ⁵	17.6	16.4	1.6	NA	NA	Canada, Peru, Bolivia, Thailand, So. Korea, Mexico, Australia

TABLE III-III (Continued)

S.N.	Material	World Production	Demand and Supply			Inventory		Main Sources of Imports
			Demand	Domestic Production	Imports	Reserves 1980	Stockpiles	
19	Vanadium	41.4 ²	6.72	5.52	3.8	NA	NA	Rep. of So. Africa, W. Germany, Finland, Canada
20	Zinc Primary	6,611	NA	294.6	247.9	24,250	548.9 ⁷	Canada, Mexico, Australia, Honduras, Peru, Nicaragua, Spain
21	Zircon	NA	168	NA ¹¹	110.8	NA	37.53 ¹²	Australia, India, Rep. of So. Africa, Malaysia, Canada, Mozambique

- NOTES: 1. Excludes USSR.
2. Content of ore and concentrates.
3. Includes primary and secondary metals.
4. Net imports are obtained by gross imports less exports (if any).
5. Excludes Communist countries.
6. Includes imported metal (manufactured and refined) minus exported metal (manufactured and refined).
7. Includes private and government inventories.
8. Potassium salt to K₂O equivalent ratio by weight is approximately 1.9193.
9. Gross weight.
10. Does not include U.S. production.
11. Proprietary information.
12. Total private metal contents.
13. Government stockpiles.
14. Dry equivalent.
15. Includes manganese ore and concentrates, ferromanganese, silicomanganese, and metal.
16. Estimated.

SOURCE: (1) Mineral Yearbook - Metals, Minerals and Fuels, Vol. I, II and III, Washington: Department of Commerce, Bureau of Mines.
(2) Statistical Abstract of United States - 1980, 101st Edition, Washington: Department of Commerce, Bureau of Census.

TABLE III-IV

FORECAST OF U.S. SEABORNE TRADE IN MAJOR AND MINOR
BULK COMMODITIES: 1980 - 2000 [Ref. 13:2-2]
(Million Metric Tons)

<u>Commodity Group</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
<u>AGRICULTURE</u>	104.0	118.9	134.3	149.9
Grains (1)(E)	65.8	74.8	84.1	93.6
Rice (E)	2.6	2.6	2.7	2.9
Sorghum (E)	5.8	6.3	7.0	7.7
Soybeans & Meals (E)	24.9	30.1	35.2	40.3
Sugar (2)(I)	4.9	5.1	5.3	5.4
<u>FORESTRY</u>				
Lumber, etc. (I/E)	31.6	35.7	40.5	45.7
<u>FERTILIZER</u>	22.3	22.9	16.3	12.6
Fertilizers (3)(E)	5.7	4.8	3.0	1.6
Phosphate Rock (E)	15.0	17.0	13.0	11.0
Potash (4)(E)	0.4	0.3	-	-
Sulphur (5)(E)	1.2	0.8	0.3	-
<u>MINING</u>	127.3	148.1	174.2	200.3
Chrome Ore (I)	1.1	0.9	0.8	0.7
Coal (6)(E)	51.3	56.5	68.7	82.4
Gypsum (I)	8.4	9.5	10.5	11.5
Iron Ore (I)	45.0	57.7	68.3	78.0
Managanese Ore (I)	1.1	0.9	0.7	0.6
Aluminum Raw Mat: (I)	20.4	22.6	25.2	27.1
of which: Bauxite	15.5	16.0	16.5	16.0
Alumina	4.9	6.6	8.7	11.1
<u>IRON - STEEL</u>	23.3	25.5	26.2	28.1
Iron - Steel Scrap (E)	11.1	11.4	9.8	9.1
Iron - Steel Products (7)(I)	12.2	14.1	16.4	19.0
<u>MANUFACTURING</u>	15.5	18.5	22.6	27.1
Cement (8)(I)	4.2	4.8	5.5	6.3
Passenger Cars (9)(I)	0.7	0.8	1.1	1.3
Petroleum Coke (E)	10.6	12.9	16.0	19.5
TOTAL TRADE	324.0	369.6	414.1	463.7

(E) - Export only, (I/E) - Import and Export, (I) - Import only

(1) Wheat, maize, barley, oats + rye

(2) Raw basis

(3) Phosphate fertilizer

(4) Potassium chloride, or Muriate

(5) Brimstone or elemental sulphur

(6) Bituminous coal

(7) Unalloyed steel simi-manufactures

(8) including cement clinker

(9) excluding commercial vehicles

seaborne trade into an estimate of increases in breakbulk shipping would, by necessity, be somewhat subjective. The technological advances in merchant ship design and function, and more specifically, the increase in the number of bulk carriers and containerships, has resulted in the redirection of the traditional cargoes of breakbulk ships. So, even as projections show that the total ton-mile (TM) trade will increase from 1.7 billion TM to 2.6 billion TM during the 1985-2000 period, it is practically impossible to equate that growth to breakbulk operations other than to say breakbulk cargoes will continue to expand but probably at a slower pace than the total dry bulk market [Ref. 13:2-7]. The writer considers a 1 percent annual growth figure to be probably reasonable.

The other portion of U.S. cargo relevant to this discussion is military cargo. U.S. Army, Navy, Air Force, and Marine Corps bases are maintained outside the Continental United States (CONUS) to protect U.S. interests worldwide. These bases are predominantly supplied from the U.S. mainland. Of the ten classes of supply and MILSTAMP water commodity codes, almost all of the construction materials (Class IV) and non-military consumables (Class X) were determined suitable for carriage in breakbulk ships. Significant portions of most of the other cargo classes could also be transported in breakbulk ships [Ref. 13:2-13]. Considering just peacetime military cargo movements, DoD

sponsored dry cargo originating in CONUS is expected to consistently increase. Although the magnitude of tonnage depends on the extent of worldwide military presence, the tonnage required to maintain current levels of U.S. presence abroad is approximately 5.3 million short tons of cargo annually [Ref. 13:2-14].

Peacetime assets to move government cargo include the U.S. flag fleet and the MSC controlled fleet. Appendix A reflects summary data on all of the dry cargo moved by MSC in the years FY 1975 and FY 1981. This summary data is further broken down by the following specific types of cargo: household goods (HHG), reefer, bulk, privately owned vehicles (POV's), ammunition, general (less HHG), radio-active waste, trailers (cargo carrying), special, and aircraft.

C. U.S. CONTROLLED AND WORLD DRY CARGO FLEETS AS A MOBILIZATION ASSET

The word "mobilization" brings different pictures to people's minds depending on their perspective. The military see it as the culmination of all their planning to successfully fight a war. The Department of Transportation, the Federal Emergency Management Agency (FEMA), MARAD, and other national organizations see it as a marshalling of the entire industrial base. The average U.S. citizen, too young to remember World War II, probably thinks little beyond the

institution of the draft. In reality, it is all of the above and more. It is a process carefully planned to be made more controllable with many degrees or steps from surge, through partial mobilization, full mobilization and total mobilization [Ref. 20:54].

In this section the term mobilization will be used to refer to the military state of full mobilization where the entire reserve force is activated and defense related industries are "ratcheted up" to support it. When considering this environment, it rapidly becomes obvious how much the United States is an island power. This country is, quite simply, wholly dependent on ships both to perform and to support major national security tasks. In anything less than a full-scale nuclear war, we would need sufficient numbers and suitable types of merchant ships to supply and reinforce U.S. and allied combat forces overseas. What some planners could easily forget is that, at the same time, the U.S. would also need merchant ships to continue transporting the vast quantities of essential raw materials needed for the U.S. to fight a sustained war, not to mention the need to move all manner of bulk commodities and finished goods to help sustain allied countries. In other words, not only would the military requirements for merchant shipping increase sharply, but the "commercial" needs would also peak at the same time.

One of the most difficult problems to confront in contingency planning is the fact that the mission hierarchy for the merchant fleet in peacetime is completely reversed in a wartime scenario. The resultant national defense mission hierarchy for merchant shipping would be:

- a. Military Auxiliary,
- b. Defense resupply,
- c. Security (support of the defense economy), and
- d. Commerce.

These missions can be further broken down into six major roles during times of national emergency. These roles are: strategic sealift, Mobile Logistic Support Force (MLSF) augmentation, amphibious operations support, Logistics Over-the-Shore (LOTS), other military applications, and support of the economy [Ref. 13:3-1].

To support these roles, the Navy and the Maritime Administration must cooperate closely to ensure that commercial merchant ships, built with government support, not only perform their commercial purposes but are readily convertible to defense purposes during times of national emergency. National Defense Features (NDF) are specified so that ship designs having potential use as naval or military auxiliaries could function in the roles mentioned above. Types of general cargo ships completely or partially suitable for the role of military auxiliary, defense resupply, or security include:

- a. Breakbulk, including dry bulk carriers with breakbulk capability,
- b. Breakbulk (heavy lift),
- c. Container (cellular),
- d. Roll-On/Roll-Off,
- e. Barge Carriers,
- f. Combination (RO/RO, container, breakbulk), and
- g. Tug-Barge Combinations.

Ship types suitable for the remaining role of support for the defense economy include dry bulk carriers with no breakbulk capability, OBO carriers, and other miscellaneous types [Ref. 21:Encl (1), 2].

To attempt to determine the suitability of dry cargo ships for use in wartime, a ship type must be considered from a functional perspective within the framework of the following specific missions:

- a. Port to port delivery of general conventional cargo.
- b. Port to point delivery of general conventional cargo to an area lacking an improved, operable port.
- c. Port to port delivery of general conventional cargo along with outsize cargo capability.
- d. Port to point delivery of general conventional cargo along with outsize cargo (for example LCU's and Delong barges) with an offload capability in an area lacking an improved, operable port (this also provides the general requirements of supporting amphibious and LOTS operations).

- e. Port to point delivery of containerized cargo; in an area lacking an operable containerport (this also meets the requirements of logistic re-supply for amphibious operations).
- f. Fleet re-supply or consolidation, whereby an on-station Navy replenishment ship is re-supplied. (Dry-cargo)
- g. Provide a capability for unloading a non-self-sustaining container ship.
- h. Port to port opportune lifts of outsize military cargo. [Ref. 21:Encl (1),3]

The types of National Defense Features that could be observed and/or manipulated to better assign a specific ship to one or more of these missions would be related to speed, shock resistance, generating plant capacity, feed/potable water distillation and storage, propulsion systems, a nuclear/biological/chemical (NBC) washdown capability, military personnel facilities, communications, and cargo gear/cargo operations.

Breakbulk ships, dry bulk ships with a breakbulk capability, and heavy lift breakbulk ships in the "handy size" category (10,000-38,000 DWT) have been found to be the most useful and flexible from a national defense logistics viewpoint. The breakbulk ships must have a self-sustaining lift capacity of at least 70 long tons with an outreach of 25 feet over the side of the ship, a minimum of three holds serviced with a minimum lift capacity of 20 long tons each, and provide a 30 foot outreach to load lighters. The heavy lift breakbulk ships must have, in addition, a minimum lift

capability of 200 long tons with an outreach of 25 feet over the side. These ships would be used for port to port delivery, port to point delivery, port to port delivery of outsize cargo, port to point delivery of outsize cargo, and fleet resupply [Ref. 21:Encl (1), 7-8].

In a study of the world dry cargo contract fleet serving U.S. seaborne commerce during the period July 1980 - July 1981, a total of 1891 vessels were observed and analyzed for defense suitability. Of them, 62 percent were found suitable for an economic security role and 25 percent were suitable for a defense resupply role [Ref. 13:5-14]. The breakdown of this all important 25 percent by flag registry is displayed in Figure III-3. Assuming this 25 percent of the world's dry cargo contract fleet currently in U.S. trade were, in fact, available for hire in a wartime scenario, a fleet of approximately 480 ships of high military and defense relevance could be assembled [Ref. 13:5-13].

How this relates to potential needs is best shown by comparison. During the Korean War, an average of 400 dry cargo ships were employed in the MSC controlled fleet to sustain the deployment, representing 17 percent of the total military suitable U.S. sealift assets. At the time, 2422 dry cargo ships were available from the NDRF, U.S. Merchant Marine, and MSC nucleus fleet. In Vietnam during the peak sealift year of 1968, the MSC controlled fleet averaged 420 ships or 35 percent of the total U.S. assets. If a

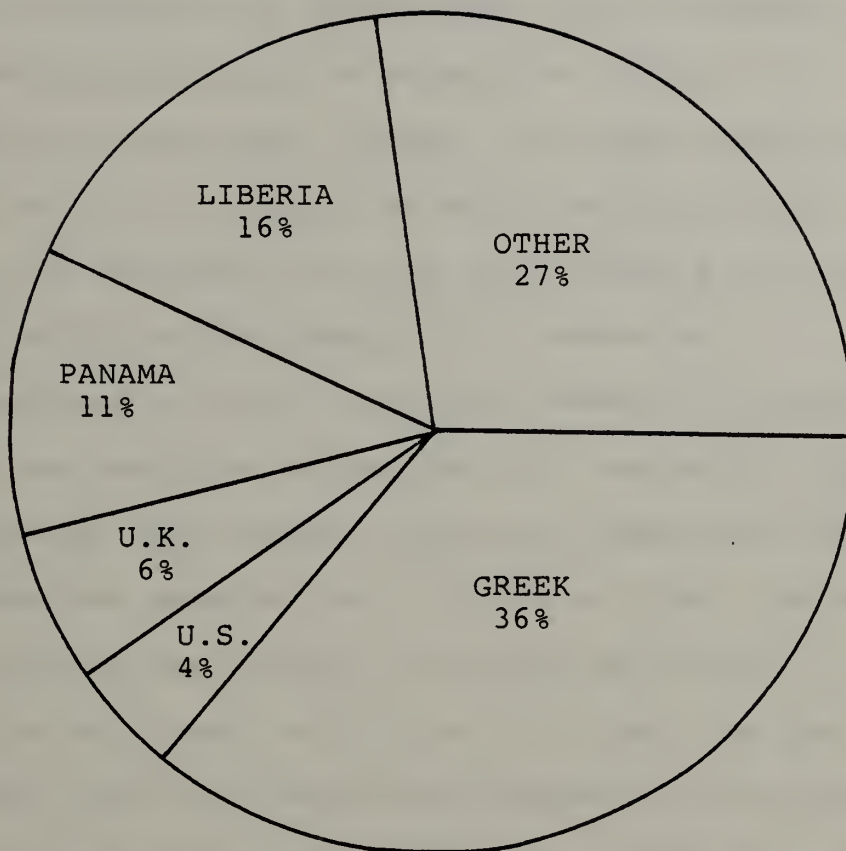


Figure III-3. Composition of the World Dry Cargo Fleet Serving U.S. Seaborne Commerce Suitable for a Defense Resupply Mission (Period July 1980 - June 1981) [Ref. 13:5-15]

contingency occurred today, requiring a sealift capacity comparable to the Korean War or Vietnam conflict, about 350 militarily suitable dry cargo ships would be needed and that represents approximately 80 percent of today's U.S. controlled dry cargo fleet [Ref. 22:26]. So, some analysts would say that the U.S. is not in so bad a position after all because in an emergency, we are still capable of providing adequate sealift with existing U.S. resources.

If one were to settle into that somewhat complacent attitude, one would be succumbing to a dangerous fallacy. To help expose this fallacy, there are some questions that should generate negative (or at least worried) responses. If the military was directly utilizing 80 percent of the U.S. controlled fleet, who is left to "mind the store?" The U.S. economy would be completely dependent on foreign flag ships for transporting everything from strategic raw materials to sophisticated manufactured goods. What happens when shipping is sunk? Where is the reserve for the Reserve? What if major foreign flag countries choose to be neutral and the Effective U.S. Controlled Fleet (EUSC) becomes ineffective? How available are allied merchant fleets for our emergency needs? Is the U.S. controlled fleet in adequate operational condition (particularly the NDRF) and could we really put together 350 functionally balanced ships? If not, and foreign flag ships had to be

chartered, is there enough slack in the world fleet to pick up the additional U.S. cargo to keep our economy going?

Most of these fears were nicely summed up in 1980 by a quote by RADM Keener, then COMSC, when he said,

"The U.S. Navy, per se, does not have and will never have organic sealift assets sufficient to meet the demands of more than the very first phases of any emergency. The cost in dollars and manpower for DoD to provide that capability would simply be too great. We rely on the U.S. Merchant Marine for emergency sealift services and sealift assets, both in peacetime and wartime ... [but] the U.S. flag merchant marine does not have in large quantities the kind of ship that we in defense see the most need for. Those are breakbulk and roll-on/roll-off, or self-sustaining, 20-foot containerships. ... In the first six months of this fiscal year [FY 79] ... the MSC spot-chartered 47 ships and because there weren't enough U.S. flag tankers, 22 of those were foreign." [Ref. 23:24-25]

If the U.S. had to mobilize in the near future, available sealift resources (excluding operating U.S. Navy Auxiliaries) would come from, first, the MSC Controlled Fleet inventory displayed in Figure III-4. The NDRF, including the Ready Reserve Force (RRF), and the privately owned U.S. flag fleet are shown in Table III-V. The Effective U.S. Controlled Fleet is displayed in Table III-VI. To better equate these figures to the major merchant fleets of the world (by flag registry) Table III-VII is included.

D. MODERN TRENDS IN DRY CARGO SHIP DESIGN AND CAPABILITIES

Breakbulk shipping in the form of small coastal carriers has been around since the beginning of seaborne commercial

For the Period 25 March - 7 April 1983
As of 8 April 1983

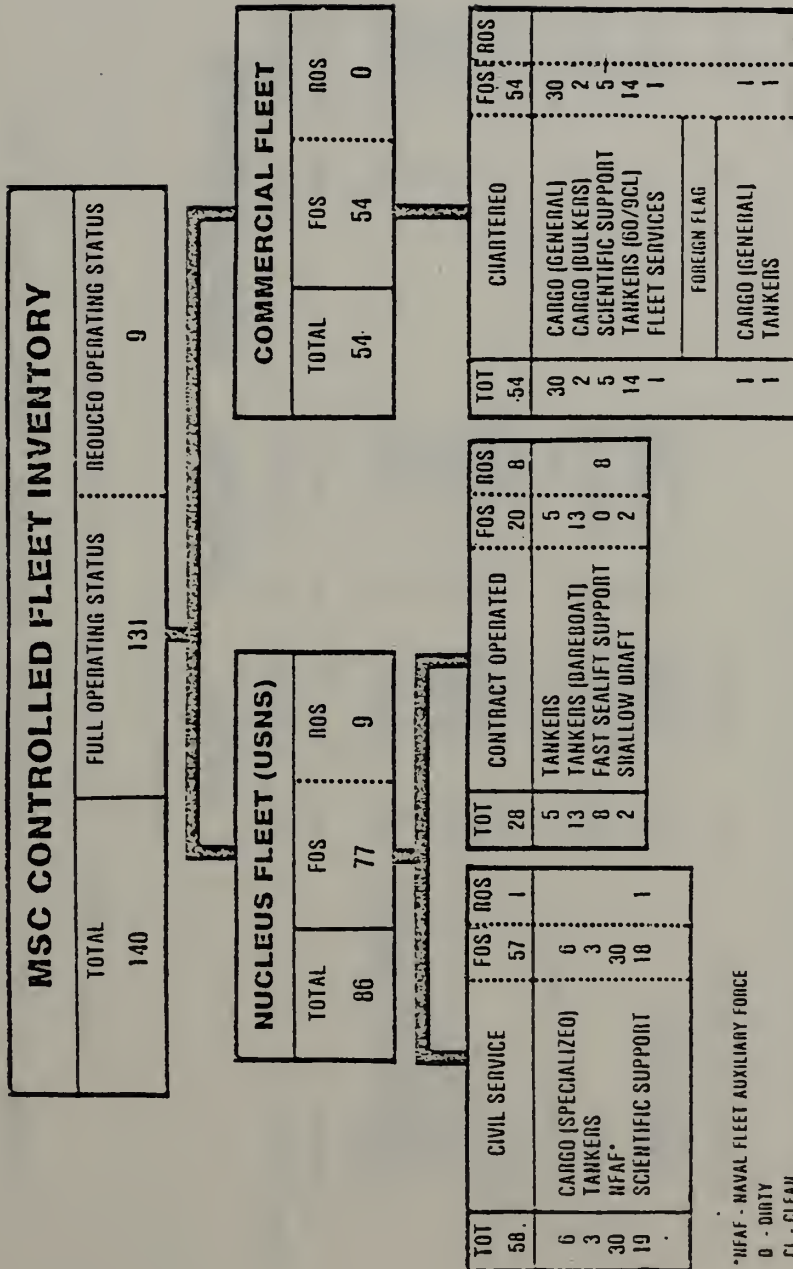


Figure III-4. MSC Controlled Fleet Inventory [Ref. 23]

TABLE III-V

INVENTORY OF U.S. CONTROLLED MERCHANT SHIPS¹ [Ref. 24:8]
(Ocean Going Ships 1000 Gross Tons and Over)

	TOTAL SHIPS		PRIVATELY OWNED U.S. FLAG	MARITIME ADMINISTRATION SHIPS	
				OPERATING	LAID-UP (NDRF)
TOTAL ALL TYPES	810	23,746,387	541	20,862,587	269 2,883,000
I DRY CARGO	445	7,055,473	265	4,954,462	180 2,101,011
GENERAL					
BREAKBULK/PARTIAL CONTAINER	266	3,202,625	104	1,404,688	162 1,797,937
CONTAINERSHIP/SELF-SUSTAINED	8	121,025	3	48,549	5 72,476
CONTAINERSHIP/NN-SHIP-SUS.	103	2,000,001	94	1,819,725	9 180,276
RO/RO - VEHICLE	21	321,575	18	274,043	3 47,532
LASH, SEABEE	21	765,148	21	765,148	
BULK	18	618,018	18	618,018	
COASTAL	8	27,081	7	24,291	1 2,790
II PASSENGER/CARGO & TRANSPORT	24	214,276	10	86,105	14 128,171
III TANKERS	280	16,090,235	266	15,822,020	14 268,215
MAJOR	241	14,476,210	227	14,207,995	14 268,215
COASTAL TYPES	6	12,474	6	12,474	
SPECIAL PRODUCTS	33	1,601,551	33	1,601,551	
IV MERCHANT TYPE AUXILIARY	61	366,403			61 386,403

¹Excludes ships in the custody of DoD and Department of Interior.

TABLE III-VI

EFFECTIVE U.S. CONTROLLED DRY CARGO FLEET [Ref. 13:2-19]

(AS OF 30 JUNE 1981)

SHIP TYPE	FLAG			NO.	TOTAL DWT 1000 LT	AVERAGE DWT
	LIBERIA	PANAMA	HONDURAS			
Bulk Carriers	91	9	-	100	6,201	62,000
General Cargo Carrier	18	15	7	40	195	4,875

TABLE III-VII

MAJOR MERCHANT FLEETS OF THE WORLD - 1 JULY 1981 [Ref. 11:46]

COUNTRY	NO. SHIPS ¹	RANKED BY NO. OF SHIPS ²	DEADWEIGHT TONS	RANK (DWT)
Liberia	2,265	4	151,157,000	1
Greece	2,945	1	72,815,000	2
Japan	1,760	5	62,662,000	3
Panama	2,603	2	42,402,000	4
United Kingdom	1,016	6	41,170,000	5
Norway	609	9	37,967,000	6
U.S.S.R.	2,541	3	22,067,000	7
United States (Privately Owned)	578	11	21,325,000	8
France	339		19,229,000	9
Italy	621	8	17,091,000	10
Spain	505	12	12,336,000	11
Singapore	597	10	11,725,000	12
Germany (Federal Republic of)	459	13	11,156,000	13
China (People's Republic of)	724	7	10,588,000	14
India	372		9,276,000	15
All Others ³	7,160		119,156,000	
Total	25,094		662,122,000	

¹Oceangoing merchant ships of 1,000 gross tons and over.²By number of ships, Netherlands ranked 14th with 452 vessels aggregating 8,068,000 DWT and Korea (Republic of) ranked 15th with 398 vessels aggregating 62,662,000 DWT.³Includes 281 United States Government-Owned ships of 2,911,000 DWT tons.

activity. The advent of tramp shipping with dry cargo vessels operating on a worldwide basis first appeared on the shipping scene about the middle of the 19th century. These ships of approximately 2000+ DWT carried commodities required by the industrial nations. The general cargo ship (a subcategory of dry cargo ships) must be evaluated by its design that should provide adequate space to carry the cargo and facilities for handling the cargo. The most typical of these ships had two decks, hence the appellation "tween-deckers." For many years, in this type of ship, the propelling machinery was situated amidships with the cargo hold forward and aft of the machinery space. Today, the tendency is to position the machinery further aft so that there are three or four holds forward of and one hold aft of the machinery space. This enables the amidships portion of the hull to be used for cargo, which is a definite improvement since cargo stouage and handling are much more convenient. There is, however, the problem of trim, but this can usually be solved by having a midship deep tank, which can be available for cargo as well as water ballast [Ref. 16:65]. The technology that permitted this substantial design change was the switch from coal to oil fuel, reducing bunker capacity needs and eliminating the necessity of storing coal fuel immediately adjacent to the engine space.

Elements of cargo handling that have also greatly improved over the years include self-supporting hatch covers

and more versatile derrick and crane design. In general, hatch ways should be as large as feasible in order to minimize the amount of horizontal movement necessary to stow the cargo. These openings must have portable coverings which can be readily removed when the ship is in port, but must be weathertight when the ship is at sea. Many designs now exist that permit the opening of these large (commonly 20 feet by 60 feet) hatches at the push of a button [Ref. 16:66]. Derricks are fitted either to single or bipod masts or special derrick posts and are operated by steam or electric winches. Cargo ships generally have four derricks for each hold with the capability of rigging two or more in tandem for certain types of cargo maneuvers. Deck cranes have the advantage of negligible rigging time and can function within an entire working radius. Cranes are used for rapid loading and discharging of cargo in the 3 ton to 15 ton range [Ref. 16:67].

Ships have continued to increase in size over time as trade routes increased in length, thus improving productivity at sea and decreasing the cost per ton-mile. However, these economies of scale at sea were being counteracted by diseconomies in port. Larger general cargo ships with proportionately bigger cargoes increased costly port time and caused bottlenecks in stevedoring operations, storage and transshipments. In other words, the ports were

not taking advantage of new technology as fast as the shipping companies were. This lag, and the associated costs, pushed shipping companies into even more elaborate technology swings to primarily reduce reliance on port operations whose management was now often accused of being unresponsive.

In all fairness, shipping is an extremely dynamic business that has fewer barriers to entry and exit than some other forms of transportation. Although ships are very expensive, the industry is not considered particularly capital intensive because the ocean "highway" is free to the user and the terminal infrastructure is provided by others thus permitting the shipping companies flexible ship utilization to meet evolving marketing strategies. The port management, on the other hand, has to look at their charter from the perspective of managing a long term, probably national, asset that serves many other social, political and economic purposes than the obvious one of loading and off-loading ships.

There were major ship design changes that resulted in permanent shifts from reliance on predominantly breakbulk shipping. The first was the development in the 1950's of specialized bulk carriers that could carry a variety of dry cargoes, be purely either ore or crude oil, or be oil/bulk/ore carriers. In order to provide rapid port turn arounds, bulk carriers must transport their goods between ports which

are equipped with specialized handling equipment. From the mid 1950's and into the 1960's, this was the most rapidly expanding segment of the seaborne shipping industry.

The late 1960's and early 1970's also saw the emergence of unitized cargo carriers including containerships, RO/RO's, pallet ships, and barge carriers including LASH and SEABEE designs. Container ships are capable of carrying cargo in prepackaged metal containers (20, 35 or 40 feet long by 8 feet high, by 8 feet wide). They have the advantage of being able to carry large volumes of cargo coupled with ease of handling, thus drastically reducing material handling and port turn around time. However, the cost of inland distribution and large container marshalling yards still keep total handling costs higher than expected.

RO/RO ships are, in general, designed for carriage of automobiles, commercial motor vehicles (including trailers) and other unitized cargo. The procedure for loading and offloading vehicles is simply to drive them on or off the ship. The cargo, in a sense, positions itself in cargo spaces. In general, the idea of doors in the sides or ends of a ship that open to form ramps was not adopted until World War II made it essential to land goods on open beaches. The types of transfer and access gear are numerous, each designed to serve a specific purpose such as a stern ramp, stern door, internal ramp, hoistable platforms, bulkhead doors, and side ramps [Ref. 16:70]. Again,

for cargo handling to be as easy as it sounds on RO/RO's, there must be close coordination between ship and shore facilities. This is particularly true with the disappearance of the RO/RO carrying its own ramps. Ramps, because they are by necessity bulky, take up a considerable portion of otherwise useable cargo space. Therefore, newer RO/RO's rely on port facilities to provide ramps suitable to their quay and tidal conditions.

Pallet ships were developed to support routes where cargo in containers was not sufficiently flexible. Cargo handling methods are based on slings and pallets. Most ships built for palletized cargo also handle other cargo. For instance, a ship built for this purpose, the Manora, is built to transport cargo as follows:

- a. Pallets shipped through side-ports and also by crane; the pallets are then moved forward and aft by truck in the upper 'tween decks.
- b. General cargo carried in the holds.
- c. Containers on the upper deck. [Ref. 16:74]

Another attempt to cut in-port turn around time and thereby cut costs has led to the development of barge carrying ships. The LASH ship uses a "lift-up and lift-over" (LO/LO) technique with 500 ton gantry cranes to stow pre-loaded lighters. The SEABEE ships, on the other hand, float barges onto an elevator of approximately 2000 ton capacity and use a roller system for stowage. The primary advantage of these carriers is that they are capable of loading and

unloading barges in rivers and estuaries away from docks and quays. Thus, they reduce the time in port and avoid the usual problems of port congestimn [Ref. 16:80]. They also have obvious military applications of over-the-shore discharging of cargo in locations where no port facilities exist.

Not only have ship configurations changed over the past thirty years to meet new shipping demands, but less visible technological advances have also made major impacts by increasing ship productivity. Hull systems have been improved to increase speed and facilitate seakeeping, propulsion systems have become more fuel efficient, cargo handling and containment has become more sophisticated, navigation and communications have made tremendous strides, steering, maneuvering and mooring capabilities are much improved, and automation and control systems have truly revolutionized the merchant shipping industry.

IV. SIGNIFICANT LEGISLATED POLICY CHANGES AND OPERATIONAL TRENDS IMPACTING THE U.S. LINER TRADE

A. THE MERCHANT MARINE ACT OF 1970: 1970 to 1981

As discussed in an historical context in Chapter III, the Merchant Marine Act of 1970 was an attempt to update the Act of 1936. The international maritime industry as well as the U.S. flag segment had undergone many changes since 1936 and while amendments had been made to the original Act, a major rewrite was in order. What was the goal of this new piece of legislation? First and foremost, it restated the need for a strong merchant marine and a viable shipbuilding industry. At the same time it recognized that the dominant world trade had shifted from liner service to trade in bulk commodities more prevalently transported in tramps or privately owned ships. Other ship operational considerations were the technology supported shifts to bigger ships, shorter turnaround times, and decreasing manpower requirements associated with the new ships. On the shipbuilding side, the Act reflected the thinking that U.S. yards could become more efficient, and even competitive on a world market basis, if presented with the right set of conditions [Ref. 26:93].

In support of these objectives, the Act legislated the following specific actions in support of the shipbuilding industry:

- a. It mandated the construction of 300 vessels during the period 1971-1980 to promote economies of scale due to standardization and a stabilized work force.
- b. It increased the Federal Ship Mortgage Insurance funds from \$1 billion to \$3 billion to provide capital for ship construction.
- c. It permitted shipbuilders to apply for and receive CDS funds directly thus breaking the inappropriate tie between CDS and ODS.
- d. It replaced the Capital Reserve Fund with the Capital Construction Fund (CCF) for use by all eligible vessels in all trades.
- e. It authorized the purchase of foreign components for shipbuilding where insistence on U.S. components would result in an unreasonable delay in completion of the ship.
- f. It created the Commission of American Shipbuilding to act as an industry investigator and recommender of improvements [Ref. 26:93-94].

From an operations perspective, the following changes were initiated by the Act of 1970:

- a. The CCF with its attendant tax advantages was made available to the non-liner bulk cargo trades to better permit competition with foreign-flag counterparts and encourage the return of "Flags of Convenience" to the U.S. fold.
- b. "Subsistence" was eliminated as an item in the ODS to encourage greater efficiency.
- c. The "recapture clause" was eliminated in an attempt to encourage improved efficiency (i.e., if a shipping company made more profits than were allowed, they had to remit the excess profits thus encouraging them to spend to the limit).
- d. Payment of ODS funds were prohibited for seamen not necessary for the efficient manning of the vessel and tied the subsidizable wage cost of those men employed to a national wage index thus forcing both

the government and management to be more cost conscious and ultimately more competitive in the world market. [Ref. 26:95-96]

After reviewing the intent of the Merchant Marine Act of 1970, it is appropriate to look at its actual effect on the U.S. merchant marine from 1970 to 1981. This information is best displayed in tables. The actual number of U.S. flag ships built in this period is contained in Table IV-I. A snapshot view of 1978 reveals more specific data in Table IV-II. This can be compared to Table IV-III showing a total of 1134 dry cargo ships (1382 total merchant ships less 248 non-dry cargo ships) built for the world market in 1978. This represented an average shipbuilding year [Ref. 27:9].

Actual CDS and ODS paid in a similar period is shown in Table IV-IV. Changes in U.S. oceanborne foreign trade dry cargo carried including the U.S. flag market share is displayed in Table IV-V. The U.S. ocean going merchant marine existing at the end of the represented period is shown in Table IV-VI.

The tables represent a good overview of what did happen to the U.S. flag merchant fleet over that twelve year period, but it is difficult to identify what if anything is attributable to the Act of 1970. Looking again at Table IV-I, there is no question that there appears to be a shipbuilding spree by peacetime standards. As it takes time to finance, design, and build ships, the years 1973, 1974,

TABLE IV-I

NEW DRY CARGO SHIP DELIVERIES 1970 - 1981

DRY CARGO TYPE	1970	1971	1972	1973	1974*	1975	1976	1977	1978	1979	1980	1981
Breakbulk												
Container	1	3		6	6				1	1		1
Partial Container	4			1								1
Bulk			1		9	2	3	2	2	4		4
SEABEE/LASH		3	6	3	5	6						1
RO/RO	3			1	3	1	4	3				
Tug/Barge					1	1		2	1			3
Heavy Lift										2		
TOTAL	8	6	7	11	24	10	7	7	4	7		10
Total New Construction & Conversions	17	27	29	33	28 *	25	28	19	20	20		18

*This was the most shipping in DWT delivered since 1963.

(Compiled from MARAD Annual Reports 1970-1981)

TABLE IV-II

NEW SHIPS DELIVERED DURING FY78 [Ref. 28:11]

OWNER*	TYPE	VESSELS
<u>SUBSIDIZED</u>		
Gulf Oil Corp.	Crude Oil Tanker	1
El Paso Southern Tanker Co.	LNG Carrier	1
Wilmington Trust Co. (Summit II, Inc.)	LNG Carrier	1
Wilmington Trust Co. (Summit III, Inc.)	LNG Carrier	<u>1</u>
		4
<u>NONSUBSIDIZED</u>		
SOHIO Subsidiaries	Crude Oil Tankers	4
Manufacturers Hanover Trust Co. (Shipmor Associates)	Crude Oil Tankers	3
General Electric Credit Corp. (Shell Oil Co.)	Crude Oil Tanker	1
Patriot I Shipping Corp.	LNG Carrier	1
SOHIO Subsidiary	Crude Oil Tanker	1
Standard Oil Co. of Calif.	Product Tanker	1
Cleveland Tankers, Inc.	Product Tanker	1
**Matson Navigation Co.	Containership	1
**Bethlehem Steel Corp.	Bulk Carrier	1
**American Steamship Co.	Bulk Carrier.	1
**CF Industries	Tug/Barge	<u>1</u>
		16
Total New Ships Delivered FY 1978		20

* Bareboat charterer is shown in parentheses if owner is a bank.

** Dry cargo ships.

TABLE IV-III

SHIPS OVER 1000 GRT BUILT WORLDWIDE IN 1978
(By Ship Type)

DRY CARGO	
Breakbulk	503
Container	83
RO/RO	91
Special Auto	45
Bulk	265
Refrigerated	39
Combination	17
Special Purpose	71
LIQUID CARGO	
Oil	131
Chemical	23
LNG	27
OTHER	
Passenger	20
Fishing	67
TOTAL	1382

(Compiled from Reference 27, Appendices IIID, IIIE, IIIF, IIIG, IIIJ, IIIL, IIIM, IIIN, IIIP, IIIQ, IIIR, IIIS)

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TABLE IV-IV

MARITIME SUBSIDY OUTLAYS 1970 - 1981 [Ref. 29:61]

FISCAL YEAR	CDS	RECONSTRUCTION SUBSIDY	TOTAL	ODS	TOTAL ODS & CDS
1970	73,528,904	21,723,343	95,252,247	205,731,711	300,983,958
1971	107,637,353	27,450,968	135,088,321	268,021,097	403,109,418
1972	111,950,430	29,748,076	141,698,479	235,666,830	377,365,310
1973	168,183,937	17,384,604	185,568,541	226,710,926	412,279,427
1974	185,060,501	13,844,951	198,905,452	257,919,080	456,824,532
1975	237,895,092	1,900,571	239,795,663	243,152,340	482,948,003
1976	233,826,424	9,886,424	243,712,448	386,433,994	630,146,442
1977	203,479,571	15,052,072	218,531,643	343,875,521	562,407,164
1978	148,690,842	7,318,705	156,009,547	303,193,575	459,203,122
1979	198,518,437	2,258,492	200,776,929	300,521,683	501,298,612
1980	262,727,122	2,352,744	265,079,866	341,368,236	606,448,102
1981	196,446,214	11,666,978	208,113,192	334,853,670	542,966,862

TABLE IV-V

U.S. OCEANBORNE FOREIGN TRADE/COMMERCIAL CARGO CARRIED, 1971-1980 [Ref. 29:19]

CALENDAR YEAR	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Total Tons	457.4	513.6	631.6	628.9	615.6	698.8	775.3	775.6	823.1	772.2
U.S.-Flag Tons	24.4	23.8	39.9	40.9	31.4	33.8	34.8	32.1	35.0	28.2
U.S. Percent of Total	5.3	4.6	6.3	6.5	5.1	4.8	4.5	4.1	4.2	3.7
Liner Total Tons	44.2	44.6	51.3	51.4	44.3	49.8	47.8	56.5	57.0	59.3
Liner U.S.-Flag Tons	10.1	9.8	13.2	15.3	13.6	15.4	14.4	16.0	15.7	16.2
Liner U.S. Percent	22.9	21.9	25.8	29.8	30.7	30.9	30.2	28.3	27.5	27.3
Non-Liner Total Tons	220.7	242.6	281.9	282.7	275.3	289.6	289.0	308.8	342.7	356.7
Non-Liner U.S.-Flag Tons	4.8	3.8	4.5	5.0	3.8	4.9	5.7	4.5	3.6	4.1
Non-Liner U.S. Percent	2.1	1.6	1.6	1.8	1.4	1.7	2.0	1.5	1.0	1.2
Tanker Total Tons	192.5	226.4	298.4	294.8	296.0	359.4	438.6	410.3	423.4	356.3
Tanker U.S.-Flag Tons	9.5	10.2	22.2	20.5	14.0	13.6	14.6	11.6	15.7	7.9
Tanker U.S. Percent	4.9	4.5	7.4	7.0	4.7	3.8	3.3	2.8	3.7	2.2
Value (\$ Billions)										
Total Value	50.4	60.5	84.0	124.2	127.5	148.4	171.2	195.8	242.1	294.3
U.S.-Flag Value	9.9	11.1	15.9	22.0	22.4	26.4	28.0	30.7	35.7	42.3
U.S. Percent of Total	19.6	18.4	18.9	17.7	17.5	17.8	16.4	15.7	14.7	14.4
Liner Total Value	32.4	37.4	49.6	63.4	64.0	75.8	82.3	99.9	117.6	136.9
Liner U.S.-Flag Value	9.2	10.3	14.4	19.4	20.0	23.9	25.2	28.6	32.5	39.2
Liner U.S. Percent	28.4	27.7	29.1	30.6	31.2	31.6	30.7	28.6	27.6	28.7
Non-Liner Total Value	13.2	17.4	25.2	34.7	36.6	38.2	42.7	52.5	62.0	74.1
Non-Liner U.S.-Flag Value	.4	.4	.7	.8	1.0	1.1	1.2	1.0	1.1	1.3
Non-Liner U.S. Percent	3.1	2.4	2.5	2.3	2.8	2.8	2.8	1.8	1.7	1.8
Tanker Total Value	4.9	5.7	9.2	26.0	26.9	34.4	46.2	43.4	62.5	83.3
Tanker U.S.-Flag Value	.3	.4	.8	1.8	1.4	1.4	1.6	1.1	2.1	1.8
Tanker U.S. Percent	5.5	6.2	9.1	6.9	5.1	4.2	3.5	2.7	3.4	2.1

Note: Table includes Government-sponsored cargo; excludes Department of Defense and U.S./Canada translake cargoes.

TABLE IV-VI

U.S. OCEANGOING MERCHANT MARINE [Ref. 29:15]

30 SEPTEMBER 1981¹

	Privately Owned		Government Owned		Total	
	Ships	Deadweight Tons (000)	Ships	Deadweight Tons (000)	Ships	Deadweight Tons (000)
ACTIVE FLEET:						
Combo Passenger/Cargo	5	45	5	39	10	84
Freighters	97	1,316	9	67	106	1,383
Bulk Carriers	14	471	0	0	14	471
Tankers	249	12,781	2	21	251	12,802
Intermodal	139	2,957	1	22	140	2,979
Tug/Barge	11	342	0	0	11	342
LNG	7	500	0	0	7	500
TOTAL ACTIVE FLEET	522	18,412	17	149	539	18,561
INACTIVE FLEET:						
Combo Passenger/Cargo	2	13	52	334	54	347
Freighters	13	158	190	2,070	203	2,229
Bulk Carriers	3	71	0	0	3	71
Tankers	24	2,261	16	257	40	2,518
Intermodal	10	177	7	106	17	283
Tug/Barge	1	41	0	0	1	41
LNG	6	428	0	0	6	428
TOTAL INACTIVE FLEET	59	3,149	265²	2,767	324	5,916
TOTAL ACTIVE AND INACTIVE:						
Combo Passenger/Cargo	7	57	57	373	64	430
Freighters	110	1,474	199	2,138	309	3,612
Bulk Carriers	17	542	0	0	17	542
Tankers	273	15,042	18	278	291	15,319
Intermodal	149	3,134	8	128	157	3,262
Tug/Barge	12	383	0	0	12	303
LNG	13	928	0 ³	0	13	920
TOTAL AMERICAN FLAG	581	21,561	282³	2,916	863	24,477

¹Vessels of 1,000 gross tons and over, excluding privately owned tugs, barges, etc.²Includes vessels in bareboat charter and 16 vessels in custody of other agencies.³National Defense Reserve Fleet consists of 262 ships, of which 25 are scrap candidates other than NDRF. Excluded are 64 vessels owned by U.S. Navy which are in custody of MARAD's Reserve Fleet.

NOTE: Tonnage figures may not add due to rounding.

and 1975 included ship deliveries that were directly related to the new emphasis on bulk trades. The objective of cost reduction also appeared effective as the CDS rate has consistently decreased which permits the building of more ships with the same or less outlay of funds [Ref. 26:97]. In fact, with the "buy foreign" legislation passed in 1981, no CDS funds were requested for FY82, FY83, and FY84. Pressure by shipbuilding interests has kept this legislation from being implemented and, consequently some CDS funds were reinstated into the FY82 and FY83 national budgets. However, the last ship to be built with CDS funds probably was the tanker Falcon Champion built to be chartered by MSC and launched 10 September 1983. As a result of changes in the ODS, there was more emphasis on reducing operational costs also. This was the era of taking advantage of technology to increase speeds, reduce turn around time, build bigger capacity ships, and innovate to reduce crew size.

It should be noted that this encouragement to become more competitive on the world markets has led directly to the unsuitability of most of these newer ships for military purposes. For instance, although breakbulk shipping was alive and well in world trade as evidenced by the makeup of the ships delivered worldwide in 1978, not a single breakbulk ship has been built in the U.S. during the period under review. Although bulk shipbuilding was encouraged by the Act of 1970, the U.S. continued to lose market share in

this basically non-liner trade (see Table IV-V). The U.S. never came close to its goal of 300 subsidized ships and, in fact, only 68 were attributed to the 1970 Act. This was primarily because the funds for this 300 ship mandate were tied to annual appropriations. Congress has a notoriously short memory when it comes to promises of funds in the out years.

Another approach at reviewing the long term effect of the Merchant Marine Act of 1970 is to look at follow-on legislation; in particular, the Omnibus Maritime Bill, HR. 4769, initially submitted in 1979. A "White Paper" on the bill released by Representative John M. Murphy, the then-Chairman of the House Merchant Marine and Fisheries Committee, investigated the total spectrum of U.S. maritime capabilities, particularly as they related to national security requirements, and concluded: "The American-flag merchant fleet is virtually incapable of meeting projected wartime demands. Moreover, present fleet resources would be severely taxed by a peacetime movement across secure sea lanes in a non-NATO contingency" [Ref. 23]. If this sounds familiar, it is because similar statements were made to support the Merchant Marine Act of 1970.

The Omnibus Maritime Bill is currently back in committee and there are signs it will never be passed in its entirety, mainly because it is considered too broad in scope and, hence, a consensus is just too difficult to obtain. Special

interest groups, individuals, and lobbies who are proponents of one section are usually indifferent or hostile to other sections of the bill.

Another reason the bill in its entirety has little chance of passage relates to a recent Comptroller General report that examined the allegations that regulation under the Shipping Act of 1916 led to a decline of the U.S. flag liner fleet, led to inefficient service, and damaged foreign relations. The conclusions of the report stated:

"While valid reasons exist for modifying the Act, GAO does not believe the current condition of the general cargo liner segment of the U.S. Merchant Marine is among them. Certain provisions of the Act have fostered inefficiencies and high costs in the ocean liner shipping industry and strained foreign relations, but the U.S. flag liner fleet has performed adequately and does not appear to be in the state of decline generally ascribed to it" [Ref. 30:i].

However, three primary thrusts of this bill for maritime reform have basically been broken out and submitted independently. On the regulatory side, the reaffirmation of the anti-trust immunity in liner conferences has passed the Senate as S47 and is currently expected to pass in the House as HR 1878. A whole potpourri of reforms such as modifying subsidies, redesigning cargo preference, and instituting indirect incentives have all been resubmitted in various forms with differing degrees of acceptance. The initially proposed amendments to the tax code have mostly been rejected [Ref. 31].

All in all, it would be difficult to call the Merchant Marine Act of 1970 a success. At best, one might concede that without it, things could be worse.

B. U.N. CONFERENCE ON TRADE AND DEVELOPMENT (UNCTAD) CODE OF CONDUCT FOR LINER CONFERENCES

The subject Code, which went into effect in October 1983 after ratification by our principal European allies, has been under heated discussion since its formulation in 1974. The United States has remained the major maritime power holdout primarily because two of the core provisions in the code sanctioning cargo sharing and closed conferences are contrary to our laws and/or traditional policy on such matters. Consequently, the Code has always been fundamentally unacceptable to the United States. Other fears concerning the application and implementation were summed up in the following statement by the Honorable Samuel B. Nemirow, Assistant Secretary for Maritime Affairs, Department of Commerce during 1981 Congressional hearings:

"Our mutual problem in this regard is compounded because the code, as drafted, is open to multiple interpretations. Additionally, many countries have ratified or acceded to the code with a variety of reservations. Perhaps the most notable are the reservations, commonly known as the 'Brussels Package,' to be lodged by the member states of the European Community. Another example would be the reservations of the U.S.S.R. and other East Bloc countries which would exclude from the code's coverage the operation of joint shipping lines established on the basis of bilateral agreements to serve the trade between the countries concerned. This exclusion is significant because much of the Soviet Union's trade with developing countries is carried by such joint shipping ventures.

These two reservations, when taken together with others which I will not detail this morning, will make the application of the code a very complex and difficult affair. Each announced derogation from the code as written spawns further problems of implementation. Only after a period of trial and error will the full implications of the code's provisions reveal themselves. They cannot be forecast with precision." [Ref. 32:200]

The Code was conceived as a result of a series of research studies done in the 1960's that concluded that countries with chronic shortages of foreign exchange may consider investing in merchant shipping as a means of improving their balance-of-payments position [Ref. 33:241]. Couple this approach with a new sense of economic nationalism also sweeping through the developing countries and the root causes for the dissatisfaction with liner conferences by the developing countries are apparent. They felt their specific needs were being ignored and a rate system was being maintained which they believed to be discriminatory with respect to their exports. The developing countries, particularly in Africa, were and continue to be primarily exporters of low value bulk raw materials and importers of higher value finished goods and processed agricultural products. The Code therefore is aimed at this sense of injustice.

The part of the Code which initially received the greatest amount of attention was the cargo-sharing scheme, in which it is stated that nations which generate cargo are entitled to participation in the ocean transport of goods in

proportion to their contribution to world trade. Specifically, 40 percent of the trade is allotted to each of the two trading nations, leaving 20 percent for cross-traders [Ref. 31:242]. Note that the developing countries are not against discriminatory practices, they just want the discrimination to benefit them equally.

Every year since the UNCTAD Code of Conduct for Liner Conferences was submitted for ratification, an international conference has been held to work out differences and promote the ratification. At the UNCTAD V Conference in May 1979, it was noted that 40 countries representing 17 percent of the world liner tonnage were already contracting parties to the Code. A 25 percent minimum was required and it was expected that shortly three or four European Economic Community (EEC) members would join and thereby enter the Code into force. At that time, in response to the question of what would be the impact of the Code on liner conferences and shipper's organizations, the following response was made:

"In a strictly legal sense the U.N. Code will become the framework within which liner conferences and shippers' organizations would operate at least in the trades between contracting parties to the Code. In practical terms, however, European-based conferences would be well advised to act generally in conformity with the guidelines of the U.N. Code (plus EEC regulation where applicable), even if the range covered by these conferences includes a number of countries which are not yet a contracting party to the Code. ...The fact that one or the other Code provision does not entirely tally with the well-known provisions of the CENSA/ESC Code and its related recommendations cannot be denied. This should, however, not present major

difficulties as the UN Code is flexible. The terminus 'unless mutually agreed otherwise' appears in most of the relevant provisions of the Code." [Ref. 34:273]

With this somewhat innocuous statement, it is interesting to return to the U.S. reaction to the Code. A study commissioned by the Department of Transportation to look at the potential impact on nonmarket cargo allocation in the U.S. foreign trade, including an analysis of the possible effects of the UNCTAD Liner Code concluded it would have serious implications for U.S. ocean shipping policy, for the U.S. flag liner industry, for U.S. foreign traders and U.S. consumers, and for overall U.S. foreign policy [Ref. 35:131]. This uncompromising approach prevailed through 1979.

Only when it became obvious that ratification of the Code was imminent did the U.S. contract for another major study designed basically to look at the issues raised by a world in which the Code was in effect and the impact of the Code on U.S. carriers operating outside the Code; specifically, the impact on our export-import commerce, the impact on our ability to have a strong and healthy merchant marine, and the impact on U.S. shippers [Ref. 32:202]. The defensive posture of the U.S. is appropriately described in the following section of the 1981 hearings quoted previously:

"Mr. SUNIA. I am curious to know if anybody is enthusiastic about the code at all. It seems to me that we are not too enthusiastic about it, and neither are the other parties.

I wonder if there is a group somewhere who is supporting the code.

Mr. NEMIROW. I can give you a list of countries who are not only enthusiastic, but actively pursuing the code for their own national purposes. Most developing countries are enthusiastic supporters of the Code.

We do a great deal of business in developing countries. A great deal of our shipping assets are devoted to carrying cargoes between the United States and developing countries. We are in that environment, an international environment as a buyer/seller on each end. While we may not be enthusiastic, our objective here is to define the best environment that we can for U.S. carriers to compete in a world where your trading partners have accepted the Code.

Mr. SUNIA. Thank you.

Mr. BIAGGI. I think the gentleman makes an excellent point.

The fact of the matter is that the world has been moving, and the United States has just been looking at it. That is, I think a rather moderate statement of the facts, and that is one of the reasons why we are having these hearings.

I am just concerned that in the end, we may be enveloped by this, and have no opportunity to have any input. We may be saddled with something that we could have been in a position to alter, at least accommodate some of our concerns. It is a perfect illustration of the effect of an isolated attitude. And I am not so sure that the policy in the past has been a beneficial one."

In April 1983, with the signing by the Federal Republic of Germany and the Netherlands, the requisite quorum was reached. As the Code was written to go into effect six months after ratification, 6 October 1983 was the effective date of implementation. In preparation, the U.S. has been negotiating bilateral agreements with several developing countries. Group discussions have also been ongoing between the U.S. and the EEC and Japan in an attempt to present a unified front of developed countries to the developing countries. Japan is a bit of a problem because, although

they have publically said they would sign, there are indications that it will sign with reservations [Ref. 36]. The EEC also signed with a set of reservations sometimes referred to as the "Brussels Package" mentioned earlier. These "subsets" of the Code confuse an already complex document.

Where the world goes from here is going to be very interesting to watch. For the Code to work, major legislative efforts must still be made "at home" to make existing maritime policies of the signers of the Code consistent with the Code. This may take some time and confusion will certainly reign for the next year or two. Additionally, to support the 40-40-20 rule, there will have to be a reshuffling of world fleets because the shipping market is currently too depressed to justify a large scale building program. What types of ships the developing countries will acquire will be interesting to observe, as well as what segment of the market they will focus on. Now that many of them have modern containerports, the trend could be toward more containerization or they could stay with the more flexible multipurpose cargo ships. Another issue relates to how much of the liner tonnage displaced from UNCTAD Code regulated trades will get "dumped" on the wide-open U.S. trades. Fears remain that the important cross-trading opportunities for U.S. flag carriers will be curtailed. Close monitoring and appropriate U.S.

competetive moves will hopefully alleviate any hardships due to the Code.

C. INTERMODAL TRANSPORTATION: THE CHANGING DOMESTIC SCENE

1. Background

Up to this point, the emphasis of this thesis has been international oceanborne trade. But one cannot forget that oceanborne cargo originates in every one of the 48 contiguous states and has a considerable transportation history before ever arriving at the pier. In an attempt to give a broader perspective, the following section will discuss the growth of domestic intermodal transportation and its potential impacts on oceanborne transportation.

Intermodal transportation, specifically trailer on flatcar (TOFC) and container on flatcar (COFC), which transformed the shipping of goods from a labor intensive to a capital intensive activity, initially met with considerable resistance from both carriers and shippers. When the trucking and the railroad industries first got together to develop the TOFC or "piggyback" service, the railroads shipped trailers full one way, but completely ignored the backhaul. As a result, they lost money and became hostile to piggyback service. Since then railroad management has learned to balance its freight movements and is finding that both TOFC and COFC can be very profitable.

COFC service developed in a somewhat different fashion than TOFC. Containerization got its start in international trade over twenty years ago. It was introduced as a means of reducing handling costs, damage levels, and pilferage. Now it dominates the ocean transport market, enjoying worldwide acceptance. As the use of containerization rapidly took over import/export markets, United States shippers had to follow suit to remain competitive in world markets. U.S. shippers entered this market quickly and profitably first with their industrialized trading partners and later with their developing country partners.

As a result of this rapid expansion, and although piggyback trailers command the larger portion of the domestic intermodal market today, container transportation is attracting considerable interest within the domestic market. COFC supporters assert that "containers are just as - and in some cases more - efficient than trailers for intermodal freight" [Ref. 37:53]. Detractors cite the need for increased handling and more sophisticated equipment as major drawbacks to container use. How legitimate are these arguments? Some of the proven advantages of containerized freight include:

- a. reduced loss and pilferage,
- b. reduced transit damage,
- c. improved transit time,

- d. more effective material tracking capabilities, and
- e. container capacity to serve a temporary storage unit.

In addition, from a railroad perspective, a container presents a more aerodynamic unit than a trailer. It lacks the open space occupied by trailer wheels, which creates wind resistance. It also offers lower overhead to facilitate tunnel and elevated highway clearance [Ref. 37:53].

Some of the extra expenses associated with containers and not trailers are the more sophisticated terminal equipment for container handling and the costs of supplying "bogies" or chassis for hauling the container from the terminal or a rail connection into the hinterland.

Container proponents emphasize that shippers pay for the trailer undercarriage weight in their freight charges. Shippers argue that the weight penalty for trailer road equipment is less than 4000 pounds which is a relatively small amount when considered in relation to the total load. Therefore, the cost associated with carrying this weight is in itself insufficient to persuade shippers to switch.

If there was only internal domestic service to consider, resistance to change would probably keep piggyback service the dominant intermodal form of transportation. Again, however, the international market for U.S. goods cannot be ignored.

The use of major ports as "load centers" impacts on both TOFC and COFC transportation within the United States.

The load center theory is based on the premise that because of the high fuel costs, it is cheaper for freight to travel from several locations to the ship than for the ship to make multiple pickup stops. The ocean carriers contract with feeder ships and overland transportation companies to carry cargo to a loading point. This trend signifies a potentially large area of growth for domestic containerization.

To take advantage of this concept, at least one major railroad, the Santa Fe, is actively seeking to develop its domestic container business. The railroad is gambling that containers will ultimately replace trailers for a large percentage of domestic service "for the same reason the boxcar is being replaced - cost" [Ref. 37:53]. In response to the oft-cited criticism that containers are more expensive and difficult to handle than conventional trailers, the Santa Fe's vice-president-traffic stated, "We have no problem loading containers at our terminals, primarily because we have been gearing up to handle this business for some time. Our management is committed to intermodalism and containerization and is spending money to back that up" [Ref. 37:53]. That is a very important point. Because of the considerable up-front costs, investment in containerization is a major, long-term decision on the part of a carrier as well as a shipper. The Santa Fe has reduced its risk somewhat by focusing on the interface with ocean carriers. Almost every major port in the U.S. is currently

configured to handle containerized freight. Therefore, the investment in terminal equipment at the port ends had already been made and Santa Fe had only to develop a few of its inland terminals to provide a complete system with containerized service.

The railroad industry as a whole understands that intermodalism's future depends on improved service. Innovative ideas that are proving successful include dedicated TOFC/COFC trains that simplify handling, shorten terminal time, and reduce transit times. The development of distribution centers in major metropolitan areas where freight can be shipped via motor carrier to a hub center for transfer to rail, allows the shipper to take advantage of competitive piggyback rates while obtaining transit times comparable to those of motor carriers. New rail car designs that decrease weight, reduce clearance, lower center of gravity, expand to carry either 40 foot containers or 45 foot trailers, upgrade load stability, and enhance in-transit security are just a few of the recent technological advances supporting both TOFC and COFC. Railroads are only beginning to fine tune their operations to maximize the efficiencies inherent in intermodalism. Effective marketing, modern management techniques, liberalized regulation, and updated workrules have the potential to help the railroads regain old markets and establish new ones.

2. Major Legislation Impacting Intermodalism

During the last five years, American transportation carriers have been thrust into a deregulatory environment after decades of government regulation. Both the truck and rail industries no longer have the controlled stability of regulated industries. Instead, they now have market entry and rate making freedoms and can compete with one another on an individual rather than a collective carrier basis.

The Motor Carrier Act of 1980, signed into law on 1 July 1980, was viewed by the trucking industry as compromise legislation that adopted, with modifications, many regulatory reforms. As was expected, there continues to be a period of federal reorganization, and rationalization, in interpreting and carrying out the 1980 law. Economic regulation has been moving in the direction of allowing the industry time to react to the new regulatory environment established by Congress.

The National Transportation Policy provision in the Act specifically states as one of the objectives the promotion of intermodal transportation. The most apparent impacts of the Act relate to the influx of new carriers, increased rate activity, and expansion of both private and contract carriers into the market. Of particular interest was the addition of Section 34 to the 1980 Act. It states that a "motor common carrier or contract carrier of property may deliver to or receive from a rail carrier a trailer

moving in TOFC service at any point on the route of the rail carrier if the motor carrier is authorized to serve the origin and destination points of the traffic" [Ref. 38:24]. This provision was intended to promote intermodal cooperation by permitting greater accessibility by motor carriers to centralized intermodal transfer terminals.

An important weakness of the Act of 1980 is its failure to give to the Interstate Commerce Commission (ICC) the authority to require through routes and joint rates between trucking companies and railroads. It does, however, provide such authority for motor trucking/domestic water carrier service. Unfortunately, this interface is unlikely to occur very often. Another failure in the Act is its lack of provisions dealing with the intermodal consequences of the legislation, particularly its impact on oceanborne shipping.

The full extent of the consequences of the Motor Carrier Act of 1980 have yet to be seen. The success or failure of the Act will be largely determined by the ICC by how it interprets the various provisions. The Act may encourage railroads to cooperate with trucking companies but the degree of cooperation will be totally dependent on whether or not some rate or other advantage accrues to the railroad.

The Staggers Rail Act of 1980 has been described as "perhaps the most important railroad legislation since 1877

...when, with the original Interstate Commerce Act, (we) began the halting, fumbling, and uncertain process of putting regulatory chains on railroads" [Ref. 39:47]. Through a series of laws enacted over many years, the ICC assumed greater and greater regulatory responsibility over the railroad's fortunes, including such facets of operations as rates, service, entry and exit, and mergers and consolidations. The Railroad Revitalization and Reform Act of 1976 represented the first significant shift in approach. For the first time Congress concluded that the improvement of the railroads' fortunes appeared to depend on less regulation rather than more. By 1979, deregulation was a popular political platform. The Staggers Rail Act of 1980 was designed to create a far more limited regulatory scheme that would reflect the railroads' current competitive and financial status, and provide incentives for the railroads to cut costs, improve service and productivity and to price services more competitively. From a railroad perspective, "the railroads are getting back the freedom to set - within limits - their own rates, determine their own service standards, and try new ideas for getting business" [Ref. 39:68]. The Act did open a whole new aspect of pricing options, including contracts and volume rates that appealed to shippers and that made railroads more competitive with the motor carriers and to some degree with oceanborne trade.

On 23 March 1981, the ICC decontrolled all truck and rail services provided by the railroads in connection with TOFC/COFC movements. This action was intended to give railroads more marketing flexibility. This deregulation gave the railroads the opportunity to counteract the large efficiency advantage gained by motor carriers following their deregulation the previous year. For the first time, railroads were able to enter the retail delivery service, providing door-to-door service [Ref. 37:40].

Making a move from a regulated to a deregulated state provided a focus for opposition from organizations that felt regulation meant stability and reasonable competition which in turn provided the shipping public with good service at a reasonable cost.

The growing pains of deregulation caused numerous fears to surface. Port authorities, especially those of West Coast and Gulf Coast ports that relied heavily on land-bridge services for their revenues, feared that railroad service would decrease in quality and dependability or increase substantially in price. If that in fact happened over time, it was believed "that ocean carriers, not wanting to pay higher rail rates, [would] decide to eliminate the overland leg and carry the entire movement themselves" [Ref. 37:42]. The result being that one or more U.S. ports would be bypassed. The motor carriers claimed the railroads

now had the advantage while the railroads jealously complained about any supposed inroads by the trucking firms.

Amongst all the bickering, piggyback traffic volume continues to increase. Even during the current recession, TOFC services have held their own. One of the reasons for this apparent stability remains the high cost of fuel. Given the current high cost of transportation in general and fuel in particular, piggyback trailers on rail cars continue to represent an efficient form of moving goods in quantity over medium to long distances [Ref. 37:47]. As time passes, however, motor carriers are becoming more fuel efficient, and with the price of fuel stabilizing, at least for the moment, the rail industry will have to become more sophisticated with respect to marketing and equipment technology to substantially increase both its TOFC and COFC business.

3. The "Landbridge" Concept in Movement of Foreign Trade

The previous section primarily discussed issues related to the rail/truck interface. However, perhaps the most critical link in the intermodal system is the rail/maritime interface. This link is important because, for the United States to compete in the international market, there has developed relatively inexpensive and timely ways to transport international freight entering any U.S. port to the opposite coast for transshipment elsewhere (Landbridge). There also exists a need for goods coming from overseas

(imports) to efficiently get to the U.S. consumer in the U.S. hinterland and for goods being shipped to overseas destinations (exports) to efficiently get to the international consumers (Microbridge). Minibridges also link Far East ports with the Atlantic Coast by carrying cargo from Asia to the Pacific Coast via ocean carriers, and from the Pacific to the Atlantic by rail. These minibridges are all conducted under joint through-service tariffs with a single bill of lading and a single rate. The through rates are usually roughly equal to, or below, the rate for all-water carriage between the Atlantic Coast ports and the Far East. While there has been a lot of legal fighting concerning minibridges, the courts decided "Minibridges greatly expand the alternative forms of transportation open to the shippers' choice" [Ref. 40:20].

The importance of containerized transportation is highlighted by the following quote by the manager of marketing services for the Port of New York and New Jersey. He said, "There is no way to stop world intermodalism. It's just a matter of time before every port and steam ship line is containerized" [Ref. 37:58]. In other words, he felt all non-bulk oceanborne freight would be containerized freight, a large portion of which would originate, end up, or pass through the United States. This may be a bit exaggerated. If Table IV-VII represents a valid projection of the world merchant fleet serving the U.S. by type ship, it would

TABLE IV-VII

WORLD FLEET SERVING U.S. TRADE [Ref. 41:183]
(Actual (1975) and Projected (2000))

Type of Ship	Percentage of Ship	
	1975	2000
General Cargo	17%	11%
Partial Container	3	24
Full Container	2	2
Barge Container	1	1
Bulk	23	27
Combination	13	10
LNG	4	12
Tankers	37	13
Total all vessel types	100%	100%

appear breakbulk shipping will continue to have a market. Nonetheless, it is not unreasonable to assume that approximately 85 percent of the dry general cargo will be containerized.

To provide for this movement requires an adequate rail infrastructure suitable for carrying containerized freight, strategically located intermodal terminals and a solution to the problem of repositioning empty containers. Unfortunately, the development of inland container transfer facilities lags considerably behind water carrier progress. To try and cut costs, most existing inland intermodal facilities were created out of junked or underutilized rail

yards. These facilities continue to function on a make-do basis with inadequate paving and poor layouts.

While decisions are being made concerning investments in modern intermodal transfer facilities, railroads are getting more sophisticated in managing empty containers. These containers are routed to either "neutral pools" where they await movement to a consignee for reloading or to the closest port, not necessarily its original offloading point, to minimize imbalances of traffic. The trick is to optimize container returns by keeping utilization high. This is an area where cooperation between shippers, railroads, and the ocean shipping companies can have tremendous payoffs by reducing container handling and ownership costs.

Given the continuing increases of import/export container volume, plus the containers' potential for reducing energy requirements on inland haulage versus TOFC or over-the-road movement, economics dictate the growth of containerization for domestic as well as overseas shipping. The necessity of moving international containerized freight will spur capital investment in container handling and carrying equipment. As the infrastructure expands from the coasts inland, there is little doubt that containerization will become cost effective for almost every shipper in the hinterland thus reducing the amount of breakbulk cargo at its source, the manufacturing plant or distribution center. A good example of how this expansion of containerization at

the distribution point has impacted breakbulk cargo is the canned goods industry that used to support the domestic breakbulk trade by providing flooring-off cargo to improve utilization. Almost all of those goods are now containerized at the point of origin and shipped by land or micro-bridged to overseas destinations.

From a DoD perspective, it is an established policy that DoD cargo will be containerized for transportation whenever possible because movement of cargo in containers is cost-effective in peacetime [Ref. 42:117]. Relying on containers for cargo movement in a war or contingency, however, introduces an element of risk which must be either removed or reduced to a manageable proportion. The next section will discuss this issue at length.

D. MILITARY MOBILIZATION THINKING

1. Shift in Wartime Scenarios

Until recently, military planners concentrated almost exclusively on being prepared for a one-and-a-half war scenario which consisted of a NATO war in Western Europe and a lesser war elsewhere in the world. That entailed a focus on turning back a massive Warsaw Pact surge in a few weeks. In other words, 90-120 days was the mobilization planning horizon. Consequently, for the past ten years or so, U.S. strategic planners have been oriented toward building up combat power within the first sixty days of the

war. As a result airlift, not sealift, received most of the attention. Troops would be airlifted to the combat zone with massive amounts of pre-positioned materials waiting for them in Europe. The need for U.S. sealift was further disguised because NATO allies had earmarked some 600 cargo vessels specifically for NATO reinforcement. The U.S. planned on at least 400 of those ships to assist in reinforcing U.S. troops [Ref. 43:4]. These two facts, together with the underlying assumption that any NATO conflict would be over quickly, have obscured the need for adequate sealift resources to meet contingencies elsewhere in the world.

The role of mobilization exercises as highlighters of readiness problems cannot be underestimated. In 1976, the Army conducted the first large scale mobilization exercise in decades, named "MOBEX 76." The exercise called attention to numerous deficiencies and caused the Defense Department to sponsor a follow-on exercise in 1978, "Nifty Nugget." Soon the news media were reporting on the dangerously low state of our national preparedness. In 1979, the federal emergency planning function was withdrawn from the depths of GSA and a new Federal Emergency Management Agency (FEMA) was formed. In November 1980, an expanded mobilization exercise was held called "Proud Spirit." Whereas "MOBEX 76" had been Army only, and "Nifty Nugget" had been defense wide, "Proud Spirit" also included

the civil side of the government, led by the new FEMA [Ref. 20:56]. MSC participation in both live and command post exercises has increased as a direct result of the increased emphasis on mobilization readiness within DoD and the new awareness of the importance of sealift.

Looking at the demands for force deployment and sustainability over the next decade, it has become clear that the U.S. cannot focus on any particular area of the world and say that it is the only area needing Navy, Marine, Army and Air Force forces. The forces we need must be flexible enough to meet projected needs in NATO, the Western Pacific, Middle East, Southwest Asia and wherever else the challenge originates [Ref. 22:25]. The Iranian crisis in 1980-1981 underscored the point that there are strategic areas outside Western Europe with the Indian Ocean in the forefront, but with at least a half a dozen other spots in the world vital to U.S. interests as well. Therefore, U.S. defense planners are now preparing our forces to fight multiple conflicts simultaneously in widely scattered parts of the world [Ref. 19:13]. Consequently, the U.S. commitment to the world's sea lanes has expanded considerably. While it is gratifying to see positive signs in mobilization plans and media coverage of this new military commitment to not only a stronger navy but also to a stronger merchant marine, it can only be reiterated that it will take more

than verbal commitment to rectify the following weaknesses and make strategic planning viable:

- a. a U.S. liner fleet with average age of 17 years;
- b. a fleet that carries only 3.6 percent of U.S. foreign trade (and decreasing);
- c. only nine remaining U.S. flag liner companies;
- d. severe lack of militarily useful ship designs for fuel as well as dry cargo; and
- e. questionable availability of allied or other shipping to meet our defense needs.

2. Role of Ports in Mobilization

No discussion of military ocean cargo can be sensibly divorced from an overview of port availability and functional capabilities at the CONUS ports of embarkation (POE).

In March 1977, the Military Traffic Management Command requested that the Assistant Secretary of Defense approve the establishment of a Ports for National Defense (PND) program. The PND program would be used to examine defense interests concerning commercial ocean ports within CONUS and plan for DoD use of available cargo outloading ports during emergencies. In addition, MTMC would review the capabilities of military-owned, common-user, general-cargo and ammunition ports and would support improvements as required. The PND program was approved and is currently managed for the Secretary of Defense, by MTMC, in cooperation with the Maritime Administration, U.S. Coast Guard,

Military Sealift Command, and U.S. Army Corps of Engineers [Ref. 44:10].

One of the major purposes of the PND program is to ensure that the CONUS ocean ports can support DoD transportation requirements by the predesignation of commercial port facilities for resupply operations during national emergencies.

MTMC uses military common-user and commercial port facilities for outloading DoD cargo. Peak outloading requirements, which are generally associated with defense-related emergencies and mobilization, call for much more intense use of commercial ports by DoD. The commercial seaport industry has proven able to provide MTMC with emergency cargo-outloading facilities during these periods of high activity. The quality of these facilities has proven adequate for DoD backup needs, since they are modern, efficient, and versatile in ability to transfer cargo to oceangoing vessels. This ability includes sophisticated container-handling systems.

The number and types of berths predesignated at commercial as well as military-owned facilities are based on DoD transportation requirements, which are projected during deployment analyses. MTMC projects port-facility requirements, and MARAD allocates commercial port facilities for exclusive DoD use during national emergencies. In Fiscal Year 1981, 57 commercial berths in 24 ports were proposed by

MTMC, validated by the Joint Chiefs of Staff, and approved by the Secretary of Defense. A list of these berths was sent to MARAD, who coordinated these DoD requirements for civil port facilities with appropriate port authorities. Of the 57 berths designated, 40 were suitable for general cargo and 17 were suitable for wheeled vehicles to be driven onto and off specially designed ships. All berths had suitable staging and storage areas [Ref. 44:11].

Another major purpose of the PND program is the identification of port facilities for unit deployments. MTMC conducts studies to identify port facilities that would be necessary for the rapid deployment of major U.S. tactical forces. The report, "An Analysis of Unit Deployments Through CONUS Ports" (April 1982), analyzes the port requirements of U.S. Army, Navy, and Marine Corps units. The port facilities identified in this study will supplement other predesignated port facilities, and the study will be used for planning unit deployments. Required port facilities and support systems, based on four mixes of ship types, have been identified for deploying units. Required port facilities in each port city have been determined, and alternate facilities have been identified [Ref. 44:12].

Some idea of relatively current military cargo workloads for major West Coast ports are found in Table IV-VIII. In addition to the West Coast data provided in Table IV-VIII, a number of Interservice Support

TABLE IV-VIII

MILITARY CARGO WORKLOADS FOR MAJOR WEST COAST PORTS

Military Ocean Terminal, Bay Area (MOTBA)
(Army-owned and operated)

Oakland Army Base
Bldg 1
Oakland, California 94626

Cargo Workload (MTONs): (FY 82)

	<u>BREAKBULK</u>	<u>CONTAINER</u>	<u>TOTAL</u>
MOT Bay Area	142,634	1,086	143,720
Bay Area Coml	72,146	1,255,424	1,327,570
TOTAL	214,780	1,265,510	1,471,290

Container stuffing/unstuffing*: 403,350 MTONs

POVs processed: Export	7,367
Import	4,908
TOTAL	12,275

Pacific Northwest Outport (PNW)

Pacific Northwest
4735 Marginal Way South
Seattle, Washington 98119

Cargo Workload (MTONs): (FY 82)

	<u>BREAKBULK</u>	<u>CONTAINER</u>	<u>TOTAL</u>
PNW Outport-Seattle	21,870	342,614	364,484
Tacoma	41,226	-	41,226
Portland	1,288	6,482	7,770
TOTAL	64,384	349,096	413,480

Container stuffing/unstuffing*: 52,560 MTONs

POVs Processed: Export	4,691
Import	3,128
TOTAL	7,819

Southern California Outport (SOCAL) (SOCAL has since switched to San Pedro, CA)

Berth 146
Wilmington, California 90744

Cargo Workload (MTONs): (FY 82)

	<u>BREAKBULK</u>	<u>CONTAINER</u>	<u>TOTAL</u>
SOCAL Outport	12,611	288	12,899
SOCAL Coml	93,162	233,993	327,155
TOTAL	105,773	234,281	340,054

Container stuffing/unstuffing*: 91,218 MTONs

POVs Processed: Export	5,509
Import	6,352
TOTAL	11,861

*Cargo stuffing/unstuffing at terminal, but recorded as moving
over local commercial piers.

(Compiled from data in Reference 45)

Agreements exist between MTMC area commands and two non-ammunition oriented Naval West Coast activities; the Naval Construction Battalion Center at Port Hueneme, CA and the Naval Supply Center at San Diego, CA. The MTON's of cargo loaded on MSC ships from these locations in FY82 were 81,553 and 42,408 respectively.

3. Military Cargo Containment and Handling Trends

When discussing this topic, it is appropriate to look at the DoD interface with the commercial intermodal transportation system in both peacetime and mobilization scenarios. While the peacetime movement of military cargo has followed the lead of the commercial sector into containerization, there remain a number of DoD mobilization requirements that have no commercial counterpart and consequently must be planned well in advance of the anticipated need.

Not to dwell on the domestic intermodal scene discussed earlier in this chapter, the emphasis here will be on the port of embarkation (POE) and port of debarkation (POD) (i.e., when the cargo reaches the beach). First, the three primary ocean intermodal systems and their associated carriers; the containership, RO/RO, and LASH/SEABEE briefly described in Chapter III will be discussed. These systems will be listed in descending order of cargo handling complexity (highest first) and coincidentally ascending order of military usefulness (highest last). The components of

the containership system include the container, the containership, and a containerport, which includes a rail terminal, special container cranes for vessel loading, a large container storage area, container handling equipment, and one or more land carriers to move the containers to and from the containerport and the hinterland. Components of the RO/RO system include the RO/RO ship, a relatively simple loading pier, a loading ramp, a small storage area, and the wheeled vehicle, which may be either the cab and trailer or the trailer alone. Components in the LASH and SEABEE system include the vessel, the barge or lighter, standard piers, and standard port cargo handling equipment [Ref. 42:11]. The LASH and SEABEE systems are particularly flexible because not only do they marry the ocean system to the inland waterway system, they are efficient methods of loading and discharging cargo at ports (or beachheads) lacking piers and warehousing.

As breakbulk shipping was displaced in the U.S. flag fleet by the above ocean intermodal systems, defense planners were deprived of the versatile ships that were selfsustaining (i.e., could load and offload their own cargo), could accept outsized cargo, and could transport ammunition.

As indicated by the hierarchy in which the three systems are displayed, containerships present the greatest problem for contingency planners. Containerships can be

either self-sustaining or non-self-sustaining. Self-sustaining containerhips are mostly conversions from older breakbulk ships. The non-self-sustaining type are by far in the majority and by definition rely on expensive and complex shoreside facilities to load and discharge. Three of the major containership problem areas are as follows:

- a. How can a non-self-sustaining containership be discharged when there are no shore facilities available?
- b. How can the non-self-sustaining containership be used in an underway replenishment role?
- c. How can sufficient shipboard containers be acquired rapidly in a contingency situation? [Ref. 42:113]

All of these problem areas exist because the U.S. transportation system is commercially oriented and there are few incentives to the commercial sector to design their logistics systems to facilitate movement of military cargo in a mobilization scenario. After all, why should shipping companies build more expensive self-sustaining containerhips when their trade is between developed containerports? Why should a containership have the capability of offloading dry cargo at sea when there is no commercial application? What is the commercial advantage to maintaining large reserve pools of containers for quick availability when well managed rotation of containers to promote utilization has proven so cost effective? If the government does not insist upon and provide the funds to finance appropriate National Defense Features, the system modifications will never be

made and containerships will remain a weak link in the sealift chain.

The military is aware of these problems and in fact is investigating opportunities to maximize DoD use of containers for its transport needs. Some of these efforts include:

- a. The potential to redesign (and reduce in size) some military equipment now marginally too large for containerization.
- b. The investigation of whether or not it is cost effective to use the container as a portable warehouse, in particular, a leased commercial container, and if so, how to optimize DoD's container inventory.
- c. A review of the design of modular (or breakdown) containers so as to reduce storage requirements when not in use.
- d. How best to standardize both container dimensions and container system support equipment between mmdes and between DoD and the commercial sector.

All of these present real opportunities for improvement. However, studies will not help much if war is declared tomorrow.

Military planners did start reacting to these new conditions by the early 1970's. By 1976 there were two major test and evaluation programs underway; the Container Offloading and Transfer System (COTS) and Logistics-Over-the-Shore (LOTS). Both of these programs were oriented toward utilization of the new containment and transfer methods now prevalent in the U.S. flag fleet.

The LOTS program was to consist of five preliminary tests including a conventional breakbulk ship, a heavy-lift breakbulk ship, a containership, a LASH, and a SEABEE. The two tests of particular interest here concern the Conventional Breakbulk Ship Pretest and the Heavy-Lift Breakbulk Ship Pretest. The purpose of the first test, conducted in April 1976, was to determine the capability of the Services to use such a vessel for deploying selected heavy, outsized LOTS equipment to a site where fixed port facilities did not exist. The LOTS test items were the Army's two newly acquired container handling cranes (140-ton and 300-ton capacities), an Army LCM-8 landing craft and a Navy 3x15 floating causeway. The cranes were disassembled so that the weight of each major component was less than 60 long tons, the maximum capacity of heavy lift booms on the majority of cargo ships. The causeway weight exceeded this capacity by .3 long tons. The risk of making that lift would normally be acceptable under emergency conditions. The major test objectives were successfully achieved with only minor and apparently correctable problems [Ref. 46:i]. The conclusion reached was that LOTS equipment could be deployed by conventional breakbulk ships with heavy-lift boom capacities of 60 or more long tons and discharged into LCM-8 landing craft in a calm to moderate sea for movement to shore. The containership cranes could be landed with minimum beach

preparation, reassembled on the beach, and positioned for subsequent container operations [Ref. 46:42].

The objective of the Heavy-Lift Breakbulk Ship Pretest, conducted in November 1976, was to verify the capabilities for deploying newly procured LOTS equipment assembled in a near ready-to-use configuration. It was anticipated that a LOTS beach and throughput system could be established more rapidly if equipment assembly requirements were minimized. Operational response time would be significantly improved because the detailed disassembly required for embarkation aboard conventional breakbulk ships, containerships, and most bargeships would not be required for the heavy-lift breakbulk ship. A secondary objective, conducting a container-oriented throughput operation, was added to the pretest for training purposes [Ref. 47:i].

The results of the pretest indicated that equipment could be deployed with minimal disassembly and emphasized the continuing need for the heavy-lift breakbulk ship. Anticipated time savings were in the order of 53 hours in the deployment of the 300-ton capacity crane with minimum disassembly. This is compared to the time needed for the more detailed disassembly required when only conventional breakbulk ships are available. The heaviest item loaded in this pretest was a 1466-Class LCV that weighed 180 long tons. The SS TRANSCOLUMBIA mentioned in Chapter II was the heavy-lift breakbulk ship used.

During the container throughput phase of the test a temporary containership discharge facility (TCDF), consisting of an Army 300-ton lifting capacity crane mounted on a DeLong barge, was used by military personnel to unload containers from a ship for the first time. A DeLong barge was also used to form a pier at the beach. The DeLong, with ramps and a 140-ton crane aboard, was beached, jacked-up, ramps lowered, and made operational in approximately 18 hours. The pier with the 140-ton crane was then used as an unloading facility for containers [Ref. 47:23].

Also tested for the first time was the Army's 300-ton capacity crane which was placed at the high water line and used as a crane-on-beach container unloading facility. Both the 300-ton crane-on-beach and the 140-ton crane on the DeLong pier were hampered by an inability to reach containers in lighters at low tide. Amphibians - LARC-LX's and LARC-XV's - were successfully and continuously used during calm seas. A causeway ferry was employed to load containers on MILVAN chassis at shipside using the TCDF, but wave motion and container alignment difficulties with the chassis made this operation unacceptably time consuming. The causeway ferry was successfully used to lighter containers at low tide and over sandbars to the beach where a front loader rapidly off-loaded the containers and placed them on MILVAN chassis [Ref. 47:26].

These early Army managed LOTS tests were followed in 1979 with plans for a more advanced series of tests called the Joint Logistics-Over-the-Shore II (JLOTS II) tests. The Navy was designated the lead service. JLOTS II was planned in three phases. Phase I (Equipment Deployment) was similar to earlier LOTS tests. It was completed in August 1983. Phase II (RO/RO Vehicle Operations), completed October 1983, was a new test with the following objectives:

- a. load RO/RO ships at port of embarkation (POE);
- b. install a RO/RO discharge facility;
- c. handle two ship configurations with integral and non-integral ramps;
- d. off-load ships offshore; and
- e. deliver vehicles to shore.

Phase III (Cargo throughput operations), planned for October 1984, will be a combination of previous and new tests which will include the following objectives:

- a. install equipment;
- b. off-load container/breakbulk ships offshore;
- c. deliver cargo to shore/marshalling area;
- d. install bulk Petroleum/Oil/Lubricant (POL) systems; and
- e. operate in sea state 3.

Phase III is interesting because it will be the first test of the new Auxiliary Crane Ship (TACS) which will be a

converted containership with three cranes capable of operating in sea states up to a 3 designation.

Both the LOTS and completed JLOTS II tests indicated containerized and other heavy equipment can be moved ashore with little to no port facilities available, serious problems need to be underscored. An over-the-shore operation requires a number of large and heavy items, such as front-loaders, sideloaders, LARC-LX's, LCM-8's, LCV's, and a variety of cranes. The paucity of heavy-lift breakbulk ships is also a major limiting factor. For example, together the two heavy-lift ships on long term charter by MSC, the TRANSCOLUMBIA and the TRANSCOLORADO, can only embark two-thirds of one Army heavy boat company on a one-time lift. Thus, careful selectivity will always have to be a criterion for deployment planning. Other than the two MSC ships, only one RO/RO currently in commercial use and with less stowage space, has the same availability for LCU deployment [Ref. 47:32]. Perversely, the increase in military utilization of containerized cargo does not decrease the military need for conventional and heavy-lift breakbulk ships in initial deployments. In some cases it even apparently increases the need. However, the identification of logistics-over-the-shore problems and the innovative use of existing technology to solve those problems indicates military planners are on the right track.

4. Manpower as a Mobilization Asset

It is all well and good to initially focus on material sealift resources, but one could have all the right kinds of ships waiting patiently for mobilization and they would be useless without the proper numbers of adequately trained personnel. The Navy manpower planners had to confront this problem in the mid-1970's and make radical personnel policy changes to alleviate the military problem. The situation is not dissimilar when one looks at the capability of the civilian maritime labor pool to man the various fleets that would come under DoD control as mobilization progressed.

As noted earlier, the first fleet available is the MSC Nucleus fleet manned by civil service mariners. The MSC charter fleet is manned by commercial crews under union contract. Tables IV-IX through IV-XI give an idea of current utilization of the existing civilian (non-civil service) maritime pool.

Should mobilization proceed, the first ships to come out of the National Defense Reserve Fleet would be the Ready Reserve Force (RRF) currently at a strength of 31 dry cargo ships and one tanker [Ref. 48]. These ships consist of the most capable and modern portion of the NDRF. Many have been upgraded through a four-phase plan funded by the Navy and are maintained in a high state of readiness so they can be

TABLE IV-IX

TOTAL DAYS WORKED ON OCEANGOING SHIPS, 1,000 GROSS TONS (GT) & OVER
(Nationwide minus Great Lakes & unknown)

	<u>1981</u>	<u>1982</u>
Licensed Deck	746,251	594,202
Licensed Engine	854,572	678,459
Radio	157,087	125,316
Staff	35,833	30,166
Unlicensed Deck	1,648,385	1,330,423
Unlicensed Engine	1,161,372	926,447
Cooks and Stewards	1,166,627	956,516
Miscellaneous	<u>10,891</u>	<u>9,978</u>
TOTAL	5,781,018	4,651,507

(Data received from the Office of Maritime Labor and Training,
MARAD)

TABLE IV-X

AVERAGE DAYS WORKED PER MAN ON OCEANGOING SHIPS, 1,000 GT & OVER
(Nationwide minus Great Lakes & unknown)

	<u>1981</u>	<u>1982</u>
Licensed Deck	107.5	97.3
Licensed Engine	106.3	98.0
Radio	115.5	103.2
Staff	117.9	118.3
Unlicensed Deck	116.9	110.1
Unlicensed Engine	121.1	114.7
Cooks and Stewards	113.0	107.6
Miscellaneous	52.4	45.6

The data includes all persons who sailed on oceangoing ships, 1,000 GT and over during the specified calendar year and received a U.S. Coast Guard discharge slip, even though they may have only worked a few days. Persons who sailed but did not received a U.S. Coast Guard discharge slip are not included. For example, civil service personnel aboard M.S.C. ships are not included.

(Data received from the Office of Maritime Labor and Training, MARAD)

TABLE IV-XI

NUMBER OF SEAFARERS WHO WORKED ON OCEANGOING SHIPS, 1,000 GT & OVER
(Nationwide minus Great Lakes & unknown)

	<u>1981</u>	<u>1982</u>
Licensed Deck	6,940	6,107
Licensed Engine	8,040	6,922
Radio	1,360	1,214
Staff	304	255
Unlicensed Deck	14,106	12,080
Unlicensed Engine	9,593	8,079
Cooks and Stewards	10,321	8,886
Miscellaneous	208	219
TOTAL	<u>50,872</u>	<u>43,762</u>

The data includes all persons who sailed on oceangoing ships, 1,000 GT and over during the specified calendar year and received a U.S. Coast Guard discharge slip, even though they may have only worked a few days. Persons who sailed but did not receive a U.S. Coast Guard discharge slip are not included. For example, civil service personnel aboard M.S.C. ships are not included.

(Data received from the Office of Maritime Labor and Training, MARAD)

crewed and made ready for service in five to ten days. Current plans, projecting for the next five years, are to build up the RRF to over 60 ships by not only upgrading existing ships in the NRDF inventory, but also by encouraging turn-ins by the commercial sector [Ref. 48]. These ships would, upon callup, be manned by crews from the existing maritime work force and from those who can be persuaded to return to sea to help meet the demands of any national emergency. Table IV-XII displays the manpower requirements of typical type ships in the RRF. Because employment is currently low in the maritime industry, the manning of the RRF does not appear to be a problem. However, the manning of the rest of the NDRF, as it is phased in over a 60-day period, appears precarious indeed.

The U.S. Merchant Marine contributes to the U.S. sealift posture in non-mobilization situations (note that the Vietnam sealift fell into this category) through the Sealift Readiness Program (SRP). This program provides U.S. flag ships as a contractual commitment which is a prerequisite to carriage of DoD peacetime cargo. Privately owned ships built and operated with federal subsidy also must be offered for SRP enrollment. Plans would have about 177 dry cargo ships and 39 tankers committed for call-up in a phased schedule under this program [Ref. 49:13]. Should requisitioning become necessary, the SRP ships, then other U.S.

TABLE IV-XII

MANNING, READY RESERVE FLEET [Ref. 49:122]

	<u>Victory</u>	<u>C-3</u>	<u>C-Train</u>	<u>C-4 Mariner</u>
Licensed Deck	5	5	5	5
Licensed Engineer	6	6	5	6
Radio	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
Licensed	12	12	11	12
Unlicensed Deck	10	11	12	10
Unlicensed Engineer	11	10	10	11
Unlicensed Steward	<u>9</u>	<u>8</u>	<u>7</u>	<u>9</u>
Unlicensed	30	29	29	30
TOTAL	42	41	40	42

Merchant Marine ships useful for military sealift would be requisitioned by MARAD which, as the National Shipping Authority, has the responsibility for allocating shipping assets between military and civilian needs. An important consideration must be who will man these ships and what obligations they will incur.

The final source of ships in a mobilization scenario is the Effective U.S. Controlled fleet. Should in fact these U.S. owned ships registered under foreign flags actually be made available, they present a serious manning problem in that their foreign crews may have to be dismissed and U.S. citizen crews found on short notice.

Up to this point in the thesis, strictly seafaring manning has been discussed. Activating any large number of ships will, of course, have tremendous impacts on shipyard labor as well as longshore labor. However, to limit the focus to seafaring labor, Table IV-XIII displays trends since 1926. A joint MARAD/MSC study entitled "Civilian Seafaring Manpower Requirements in Peace and War, 1978 to 1984" concluded that while the U.S. would probably have sufficient mariners to man ships in a minor emergency, it would stretch our manpower resources to the limit [Ref. 49:16]. Another problem is that as the maritime industry remains depressed and employment practices generally require that jobs go to the most senior man, the

TABLE IV-XIII

SEAFARING EMPLOYMENT, OCEANGOING COMMERCIAL SHIPS,
1,000 GROSS TONS AND OVER: 1 JANUARY 1926 - 1980
[Ref. 49:121-122]

<u>YEAR</u>	<u>CARGO</u>	<u>TANKERS</u>	<u>PASS/COMBO</u>	<u>TOTAL</u>
1926	26,350	10,280	20,250	56,880
1927	30,330	10,850	19,870	61,050
1928	28,450	11,350	20,380	60,180
1929	28,870	11,130	21,500	61,500
1930	29,630	11,820	22,450	63,900
1931	25,730	10,850	22,350	58,930
1932	22,300	10,530	22,100	54,930
1933	19,400	9,880	22,100	51,380
1934	21,120	11,330	22,850	55,300
1935	21,400	11,820	21,880	55,100
1936	22,630	12,170	21,200	56,000
1937	14,720	12,580	13,330	40,630
1938	23,350	12,250	18,280	54,880
1939	20,850	13,530	16,200	50,580
1940	23,860	13,130	15,200	52,190
1941	22,380	12,670	13,560	48,610
1942	25,080	13,580	10,780	49,440
1943	35,460	11,490	4,680	51,630
1944	76,050	19,500	4,520	100,070
1945	110,980	29,070	3,930	143,980
1946	131,570	29,970	4,010	165,550
1947	89,410	20,150	5,050	114,610
1948	73,529	18,399	7,924	99,852
1949	41,096	19,065	7,778	67,939
1950	33,748	17,220	8,418	59,386
1951	28,123	17,712	8,107	53,942
1952	65,863	18,122	9,178	93,163
1953	42,011	17,507	9,799	69,317
1954	36,560	15,416	8,529	60,505
1955	33,249	14,719	8,338	56,306
1956	32,482	15,607	8,249	56,329
1957	34,637	14,844	8,704	58,080
1958	31,447	13,160	8,930	53,537
1959	28,650	13,763	9,227	51,640
1960	27,762	12,224	7,031	47,017
1961	28,668	12,053	8,560	49,281
1962	27,941	12,205	8,315	48,461
1963	24,975	11,381	6,185	42,541
1964	28,293	11,230	7,713	47,236
1965	28,529	11,059	7,484	47,072
1966	32,827	10,985	7,084	50,896
1967	37,620	11,291	7,084	55,995
1968	35,982	10,877	6,207	53,066
1969	32,107	11,094	5,019	48,220
1970	27,985	10,748	3,151	41,884
1971	22,257	10,567	2,178	35,002
1972	17,111	9,372	1,218	27,701
1973	16,346	9,414	1,464	27,224
1974	14,775	9,754	798	25,327
1975	14,234	9,280	798	24,312
1976	12,043	7,598	860	20,501
1977	12,319	7,553	860	20,732
1978	11,870	8,017	860	20,747
1979	11,277	8,840	388	20,505
1980	10,628	8,844	388	19,860
1981	9,878	8,722	618	19,218

average age of merchant seamen is rising alarmingly. As there appears little future for the younger unlicensed mariners, little new blood is entering the system thus exacerbating the age problem. Table IV-XIV displays recent median ages of seafarers who worked on oceangoing ships.

In a statement by Admiral Keener, then COMSC, in the previously referenced 1981 hearings he said:

"I frankly do not know how Federal needs can be met short of mobilization. In our peacetime society we cannot allocate people to jobs, no matter how badly their services may be needed. Personnel readiness problems must be resolved in the event of a threat against either world peace or national survival."

There are, of course, things that can be done in anticipation of manpower shortages including:

- a. the development of procedures for expanding recruitment programs and accelerating training programs,
- b. to earmark Navy facilities to be used to augment the training resources of the maritime unions as well as the maritime academies, and
- c. to negotiate agreements with the unions to assure they give top priority to manning ships carrying military cargo. [Ref. 49:18]

All of these actions should be undertaken to avoid the same buildup pitfalls encountered when the Korean Conflict raised the seagoing billets from 57,000 in June 1950 to 87,000 in June 1951. The problems associated with this 53 percent increase in billet requirements in one year delayed the sailings of many ships. The roller coaster

TABLE IV-XIV

MEDIAN AGES OF SEAFARERS WHO WORKED ON OCEANGOING SHIPS,
1,000 GT & OVER
(Nationwide minus Great Lakes & unknown)

	<u>1981</u>	<u>1982</u>
Licensed Deck	48.1	43.9
Licensed Engine	44.6	40.5
Radio	54.5	54.8
Staff	54.3	54.8
Unlicensed Deck	50.6	48.8
Unlicensed Engine	50.3	49.7
Cooks and Stewards	52.6	52.2
Miscellaneous	46.0	44.0

(Data received from the Office of Maritime Labor and Training,
MARAD)

employment patterns inherent in the U.S. merchant marine along with the high wages and job opportunities ashore, made it difficult to persuade experienced seamen to return to sea. As a result, a significant shortage of licensed radio operators, engineers and able bodied seamen was experienced [Ref. 14:40].

But in final analysis, the most important factors influencing the availability of mariners are personal. If, for example, the U.S. were engaged in a war for national survival, it would be reasonable to assume that Americans would serve voluntarily as they have throughout history. But in a limited conflict, the availability of mariners would probably be more influenced by economic factors than anything else. If jobs ashore were scarce and our economy were not booming, it would be expected that mariners could be recruited rather easily. In different circumstances, however, creative incentives could be developed to meet the need. For instance, if the military draft were reinstated, maritime service could be made an alternative. In other words, the merchant marine manpower element of sealift readiness needs ongoing as well as contingency incentive programs.

V. THE COMBINED SERVICE AND RELATED FUNCTIONS
QUANTIFIED AND QUALIFIED

A. SERVICE PROVIDED BY THE COMBINED SERVICE

1. Cargo Carried and Utilization

There is no question that the Combined Service carries a considerable amount of cargo. Where it carried only approximately five percent of the total dry cargo measurement tons moved by the Military Sealift Command in FY82, that represented 24 percent of the cargo carried by all of their time charter ships. General comments concerning the cargo carried, overall utilization of cargo space, and other cargo related issues are extracted from summaries of the Sealift Cargo Ship Voyage Analyses of 1979, 1980, 1981, and 1982. Parts of the Analyses are included to better display cargo trends.

The 1979 Analysis states:

"The first six months of 1979 is characterized as a service between the West Coast and MID-PAC Islands, and another service called Tri-Coast, (EC, GC, WC) to the Far East. These services utilized 7 breakbulk ships. The last six months is characterized as a combined scheduled service utilizing only 6 ships that travel East Coast and Gulf Coast to Far East to West Coast, then from the West Coast to Far East to East and Gulf Coast. On trips to the Far East, cargo is also carried to MID-PAC Islands. From the standpoint of reducing losses the Combined Service has been quite successful. The number of voyages is reduced from 13 to 10 with only 1 additional day per voyage. MTs carried per voyage increased significantly by 2,729 MTs (from 15,681 MTs to 18,410 MTs), with resultant increases in percent of utilization, MTs lifted per day (from 163 MTs to 190 MTs), and lower costs per (000) MTM, and MTs with more favorable actual income to cost ratios per ton

of cargo lifted. This has occurred in spite of an increase in average estimated daily cost by almost \$500 per day, (\$14,947 to \$15,443). The bottom line is a reduction in average voyage profit (loss) from (\$503,592) to (\$353,124). Interestingly the fact is that actual expense in dollars per dollar of income has been reduced from 1.573 to 1.304. For 1980 the financial plan expense for chartered breakbulk ships is 1.3 dollars of expense per dollar of income. For the first 10 weeks reported the trend is continuing at approximately 1.324."

The 1980 Analysis encompassing the first full year of Combined Service operations states:

"As in FY79, utilization for voyages originating on the West Coast is about 4,100 MTs greater per voyage than for voyages originating in the East Coast. Outbound utilization from the East Coast has increased from 39% [65%] to 48% [80%], but intra and inbound cargo on controlled ships to the West Coast has decreased by about 11% [18%]. Overall average MTs per voyage has decreased from 18,410 MTs to 17,777 MTs. The cost per MT and cost per (000) MTM has increased. The ratios of increase to cost per MT and (000) MTM have improved slightly in FY 80, by 1.5% to 1.0% respectively. However, estimated daily cost are up by over 35% due to increased charter cost and increased fuel cost. Interestingly, actual expense per dollar of income has reduced slightly from \$1.304 to \$1.280, which is 2 cents lower than planned at \$1.30. Higher losses per voyage, approximately 19%, is due to a deficit plan whereby increased income at the same ratio to cost results in increased actual dollar loss per voyage."

The 1981 Analysis states:

"In FY81, utilization for voyages originating on the West Coast is about 4,400 MTs. Outbound utilization, as well as intra area and inbound has decreased in FY 81 as MTs per voyage has declined from 17,777 MTs per voyage in FY 80 to 16,161 MTs in FY 81, a decrease of 5.7%. This is the second year in a row that the Combined Service has experienced a decline in cargo. In FY 79 18,410 MTs were carried per voyage. The decline in FY 80 was 3.4%. The estimated cost per MT and cost per 1000 MTM have both increased by 19% and 9% respectively. The ratios of income to cost per MT have also increased by 3% overall due again to the decrease in cargo lifted. However, estimated daily costs are up by over 7.5% due to increase

charter hire cost tempered slightly by a decline in bunker fuel cost. Interestingly, actual expense per dollar of income has reduced slightly from \$1.31 to \$1.127 which is 2.3 cents lower than planned at \$1.15. Losses per voyage, approximately 4.2% less than in FY 80, is due to a deficit plan whereby increased income at the same ratio to cost results in increased actual dollar loss per voyage."

The 1982 Analysis states:

"The Combined Service utilized five ships on 22 voyages in FY 82 compared to six ships on 24 voyages in FY 81 with the same route structure. The FY 82 utilization for voyages originating on the West Coast is approximately 2,900 MTs per voyage greater than for voyages originating on the East Coast. The 385,203 MTs of cargo carried by the five larger ships in FY 82 is practically the same as the 385,621 MTs carried in FY 81 in smaller ships. From FY 81 and FY 82 outbound cargo is approximately 3,000 MTs higher. There was an increase of 14,000 MTs in intra area cargo, and a decrease of 17,000 MTs in inbound cargo. Outbound and intra area ship utilization has increased by 8% and 9% respectively, and inbound decreased by 3%. Unfortunately, although the number of ships in the Combined Service have been reduced from six to five or by 16.7%, the estimated daily cost per ship has increased by 22.0%. The P/(L)\$ remains within 1% at an estimated \$408,318 loss per voyage. Clearly the breakbulk billing rates do not compensate for the cost of the Combined Service where the number of miles steamed per billing rate mile is 200% as great as East Coast to Europe services, 4.5:1 compared to 2.2:1. The billing rate from East Coast to Japan is only 150% of the billing rate from the East Coast to Europe. Actually, the East Coast to Europe service produces a favorable P/(L)\$. The ratio of income to cost per MT for the Combined Service is .831:1, indicating that a 20.3% increase on the FY 82 billing rates to the Pacific and Far East would have made it possible to have a break even P/(L)\$. Time in port is averaging 40% for 20 to 23 port calls per voyage. This is 10% better than the worldwide average for all voyages, which is approximately 50% time in port and 50% time at sea. CSM West Coast in port activity shows that 51.6% of in port time is needed to handle cargo compared to 36.2% in East and Gulf Coast ports. Generally, the West Coast stevedore gangs work two shifts, and the East Coast stevedores work one shift. However, cargo handling productivity is averaging 1081 MT per day for the East

Coast and 1030 MT per day for the West Coast. Notwithstanding the billing rate problem and its effect in the P/(L)\$ it is requested that every effort possible be made to expedite in port activities to reduce the amount of time spent in port, and load all available cargo."

These comments indicate fairly consistent Combined Service operational trends and areas of concern. Because these are summaries, they address only a few overall categories of quantifiable voyage information; mission accomplishment is reflected by MTON's carried and number of voyages, the overall percent of utilization, the average cost (both fixed and variable), the rate structure, and the resultant average profit or loss per voyage. Because the Combined Service was structured as a functional loss control center, as mentioned in Chapter II, its financial plan was designed as a deficit plan whereby, for example in 1980, the ratio of budgeted expenses to budgeted income was 1.3:1. The trend here has been to get closer and closer to a break even operation by better estimating cargo requirements and, therefore, costs. Unfortunately, the billing rates continue, for many valid reasons, to be unrealistic with the MSC Atlantic routes cross subsidizing the Pacific routes.

Utilization of cargo space on certain legs of each voyage has consistently been a problem for the CS. Table V-I is included to show current utilization trends. Below deck utilization is actually quite good by commercial standards. Appendix A displays overall dry cargo shipments

TABLE V-I

UTILIZATION OF VESSELS ON DEPARTURE FROM WEST COAST
[Data provided by MSCPAC]

MONTH	SHIP	DAYS BETWEEN SAILINGS	MT		BELOW DECK UTIL % (**)
			(A = Actual)	(On Deck)	
FEB 82	AM TROJAN	32	A 10065	A 1757	A 88
MAR 82	DAWN	30	A 9768	A 2250	A 75
APR 82	MAL LYKES	27	A 10403	A 1584	A 83
MAY 82	BUILDER	28	A 9876	A 440	A 87
JUL 82	AMONARCH	64	A 11998	A 1808	A 88
AUG 82	AM TROJAN	30	A 10315	A 885	A 80
SEP 82	DAWN	40	A 9200	A 1045	A 78
OCT 82	MAL LYKES	22	A 9975	A 999	A 83
NOV 82	BUILDER	40	A 9800	A 1321	A 77
DEC 82	AMONARCH	34	A 11146	A 1353	A 85
JAN 83	PADAMS	27	A 12085	A 1743	A 70
MAR 83	DAWN (*)	37	A 8605	A 1386	A 74
APR 83	PADAMS	37	A 15454	A 1967	A 91
MAY 83	MASONLYKES	15	A 8699	A 1243	A 69
JUN 83	PADAMS	56	A 15557	A 2854	A 86
JUL 83	MALORLYKES	14	A 9580	A 2191	A 69
AUG 83	ELIZLYKES	30	A 10366	A 1966	A 78

(*) Actual MT adjusted to include space utilization for M-130 container lift.

(**) Based on .4 (40%) broken stow factor.

moved by MSC in 1975 and 1981. Although there was an overall 21 percent decrease in cargo, some significant changes include:

- a. a 72 percent decrease in ammunition, hazardous cargo, and radioactive waste;
- b. a 99 percent increase in cargo carrying trailers;
- c. a 66 percent decrease in special cargo;
- d. a 43 percent decrease in cargo via time and voyage charter; and
- e. a 65 percent decrease in breakbulk cargo via commercial agreement.

2. Special Lift Issues

There are three often used rationales that support the continued operation of a peacetime scheduled breakbulk service by MSC. The first is that the military regularly requires heavy or special lifts that could not be met in a timely manner by a commercial U.S. flag carrier. The second relates to the inaccessibility of many of the Pacific islands to regular commercial traffic, and the third rationale is oriented toward availability of ships for mobilization exercises.

The MILSTAMP definition of special cargo is:

- a. all wheeled or tracked vehicles not POVs regardless of size; or
- b. cargo more than 10,000 lbs; or
- c. cargo more than 35 feet in any direction.

Therefore, not all cargo fitting the tariff structure of special cargo such as telephone poles or outsized steel products is necessarily a heavy lift item. Some recent MSC cargo that did require special handling included sonar domes (27,000 lbs), a surfacer machine (approximately 10,000 lbs), a concrete batch plant (42,250 lbs), and a ship reduction gear (138,000 lbs) [Ref. 50]. Most of these items could be carried by any ship in the CS fleet as they currently range in lift capacity from 60 to 80 tons.

Occasionally very heavy items must be transported. The two heavy lift ships employed by MSC are the TRANSCOLORADO and the TRANSCOLUMBIA which both have boom configurations that when married are capable of lifting 240 long tons. Together with one barge ship and one RO/RO in commercial operation, these ships represent the heavy lift capability of the entire U.S. flag fleet. If the TRANSCOLORADO and TRANSCOLUMBIA did not remain under contractual agreement to MSC, there is considerable doubt that their services could be guaranteed to meet the shipper services' intermittent and irregular requirements. Even when available, these ships would be provided at considerable cost to the government.

The flexibility and timeliness of CS services in the Pacific and Far East is also more than just a convenience. There is scheduled commercial container service as well as

liner and tramp breakbulk service available from West Coast ports to Hawaii, Kwajalein, Japan, Okinawa, Korea, and the Philippines. Breakbulk service to Hawaii is via barge, and breakbulk space on container vessels can also be negotiated on an as-required basis from Matson and U.S. Lines. Breakbulk service to Guam would be on an inducement basis as there is currently no pure breakbulk service to this destination. Service to other Far East locations could be provided utilizing a combination of service presently available with Lykes' scheduled RO/RO's and with American President Line's (APL's) C-5 tramp service into the Far East and Southeast Asia [Ref. 51:1].

The problems arise when, unlike CS vessels, there is no one carrier which services all CS ports as they exist today, (e.g. Tacoma/Seattle (APL, Barge), Oakland (all), Port Hueneme (none), Long Beach (all), San Diego (none)). However, it should be noted that all have in the past, on inducement (750-1000 MT), been willing to consider calling at MOTBA, Oakland, San Diego, and Port Hueneme. Ports for which there are currently no scheduled or semi-scheduled tramp service include Midway Island, Wake Island, intra-West Coast movements, and West Coast - East/Gulf Coast. There is reason to believe that service to these areas could be induced on a basis of volume and cost. Based on known U.S. flag shipping in the Far East, interport shipping for this

area would be questionable, particularly where shipping in more than one direction would be necessary. As noted earlier, the transportation of not only special cargo but also aircraft and hazardous cargo would require considerable prior and sensitive coordination with respective commercial carriers to ensure availability and timeliness of lift as well as negotiated rates [Ref. 51:2]. The criticality of some Required Delivery Dates (RDD's) would result in special planning and coordination challenges in a purely commercial market and could require cargo to be diverted to foreign flag ships under not very unusual circumstances.

The issue of the CS as an available and reliable mobilization exercise resource is of particular concern because of the dwindling U.S. flag assets, especially on the West Coast. It is felt that not enough of the right kind of ships are available to meet existing exercise requirements or planned requirements. The knowledge that CS ships are available on reasonably short notice is a particular advantage to mobilization exercise planners. This capability would be difficult to duplicate in a totally commercial shipping environment.

3. The CS and Surge Requirements

Chapter IV included a section on the changing perspectives of contingency and mobilization planners. That information is significant because the CS is continually

being evaluated within the framework of overall MSC surge breakbulk capability. The CS ships as a percentage of the chartered MSC dry cargo fleet changes continually but fluctuates between 15 to 30 percent. The U.S. Naval Ship (USNS) fleet, as seen in Table V-II, contains one refrigerated cargo ship, five dry cargo ships, four vehicle cargo ships, and the four converted SL-7's [Ref. 25:1]. Therefore, as a percentage of the dry cargo surge capacity, CS ships represent 10 to 20 percent of the total MSC controlled dry cargo fleet in numbers of ships. The USNS ships are almost exclusively assigned to certain routes and/or functions that would be difficult to substitute for if they were pulled away to meet another contingency requirement.

A consistent MSC policy has been to utilize its nucleus ships and charter fleet as productively as possible. But when cargo was temporarily not available, the ships were put in Reduced Operating Status (ROS) to maintain a consistent level of surge capacity in the controlled fleet.

Other resources are also available in a less than full mobilization scenario. Two sources currently getting considerable visibility are the Ready Reserve Force (RRF) and the Sealift Readiness Program (SRP). Both of these sources can make ships available on short notice to augment the MSC fleet but within different guidelines and within different call-up phases.

TABLE V-II

UNITED STATES NAVAL SHIPS (USNS) 1 JANUARY 1983 [Ref. 25:2-4]

<u>CLASS</u>	<u>DES</u>	<u>NAME</u>	<u>DWT</u>
AK	V#3	FURMAN	8380
AK	V#3	MARSH FIELD	9649
AK	C3	NORTHERN LIGHT	12537
AK	C3	SOUTHERN CROSS	12519
AK	V#3	VICTORIA	9649
AKR	C3	COMET	10111
AKR	C7	JUPITER	19172
AKR	C7	MERCURY	19172
AKR	C4	METEOR	12326
AF	R3	RIGEL	8112
AK	-	ALGOL	27358
AK	-	ANTARES	27651
AK	-	BELLATRIX	28830
AK	-	CAPALLA	27634
TOTAL DWT			<hr/> 233100

The RRF can be made available five to ten days after requested in accordance with authority granted in Section 718 of the Defense Appropriations Act (96-154). The program to develop the RRF to provide militarily useful ships available in a quick response situation began in 1977 when the U.S. Navy transferred \$5.2 million to MARAD to begin a four-phased upgrade program of ships from the NRDF. Another source of more modern ships came from the government trade-in program that is still attracting newer ships to the RRF inventory. The objectives of the RRF have been slightly altered over time from the original concept of providing DoD with a sealift capability equivalent to that of thirty Victory Ships (approximately 340,000 measurement tons). Now a variety of ship types are used and the program is being expanded considerably to provide the primary source of surge capability. New ships are actually being built for the RRF and of particular interest are the new crane ships (TACS) that will primarily support the discharging of non-selfsustaining containerships. In conjunction with this new emphasis on the RRF, the ROS concept within the MSC controlled fleet will be phased out by FY85. Should it be deemed appropriate to put a ship in ROS thereafter, the cost will be charged to a new MSC "readiness account" instead of the readiness account currently provided by the Chief of Naval Operations (CNO).

The SRP ships are a diverse group of ships built since 1970 with government subsidy and/or operated with government subsidy. Additionally, a shipping company wishing to carry government cargo must dedicate 50 percent of his fleet (including older ships) to the program. Phasing plans are developed as part of the agreement based on the type of ship and potential uses. To press these ships into service requires an extensive but quickly orchestrated chain of events starting with the initial MSC request and culminating with the ultimate notification of the President. The callup procedures have been tested but the program has never been tried, so questions remain as to its viability as a surge capability.

This change in emphasis may have a profound impact on the Combined Service. It would appear that MSC controlled breakbulk ships are going to be more and more justified solely on projected cargo requirements and less on their capabilities as breakbulk carriers in surge scenarios.

B. THE IMPACT OF MSC CONTROLLED DRY CARGO SHIPPING ON RELATED PORT FUNCTIONS

1. Ship Characteristics and Cargo Handling Impacts

Just as port efficiencies affect CS operations, so do the characteristics of the CS ships and their operations impact the ports utilized on a regular basis. As the CS can

be described as a "liner" service within MSC controlled shipping, studies done for the commercial sector have some applicability.

One study in particular, "The Economics of Conventional Liner Breakbulk Cargo-handling Efficiency," attempts to develop an optimization model of liner characteristics that minimize total system costs, both at sea and at port [Ref. 52]. Because of numerous seasonal and random variables relative to shipping in general coupled with the additional problems associated with breakbulk cargo compositions, within hold placements, various ship design characteristics, different quay facilities, etc., the problem was generally broken down and addressed as manageable but less valuable pieces. However, the authors of the study, Mitchell Kellman and Don Shneerson appear to make a valid empirical estimate of the relationship between handling performance of breakbulk cargo on the one hand, and ship and cargo related variables on the other.

They developed a "productivity index" which is invariant to many of the factors, such as seasonal differences, which had impeded previous investigations, Their model studies the effects of a large set of ship and cargo related variables upon this index, utilizing multiple-variate stepwise linear regression techniques. The data collection effort and the development of the index will not

be discussed here. It must be explained however, that the index I_i must be calculated for each i th loading and unloading utilizing the following equation:

$$I_i = f(A_i, B_{ij}; C)_i = 1 \dots N$$

$$= 1 \dots J$$

where i = ship arrival,

j = cargo category,

A_i = a set of ship-specific variables,

B_{ij} = a set of specific cargo related and other arrival specific variables not associated with the ship itself, and

C = a further set of exogenous variables.

The resultant indices are then input to the model which can then be used to explain the inter-ship variations in the efficiencies of relative cargo handling.

Table V-III shows the ship related variables (A_i) and the handling and cargo related variables (B_{ij}) tested. Regression analysis was performed and the variables which added very little to the explanatory power of the regression were excluded from the final estimated equation. Of the nearly 20 explanatory variables tested, only five were determined to be significant. These five variables were the age of the ship, the size of the ship, the number of cranes, the ratio of the number of

TABLE V-III

VARIABLES TESTED IN THE SUBJECT MODEL [Ref. 52:195]

Ship-related Variables (A_i)	Handling and Cargo-related Variables (B_{ij})
Age	Type of hatch (steel or not steel)
Size	Average size of gang
-Net registered tons	Proportion of cargo handled indirectly
-Length	Proportion of cargo handled other than by shipcrane
-Bale capacity	Cargo-concentration indicator: The proportion of the single largest category of cargo (tons)
Number of holds	Proportion of bulk cargo
Average capacity of cranes (tons)	Proportion of palletized cargo
Number of decks	Proportion of containerized cargo
Ratio of number of hatches to number of holds	
Ratio of area of hatches to length of holds	

hatches to holds, and the proportion of tonnage carried in containers.

This analytical approach can be applied to the Combined Service and valuable lessons can be learned. Each of the five above mentioned variables will be briefly discussed and related to the current CS ships. The first finding was that the older the ship, the less efficiently was its cargo handled (both loading and unloading). In fact, the results indicated that for each additional year in the age of the ship, the cargo handling efficiency would decrease by approximately 1 percent. This consistently positive relationship implies that given two ships of identical size, one being five years old and the other being 25 years old, both carrying the same cargo composition, the cargo of the latter would be handled 20 percent slower. What this means to the CS is that, because the average age of the ships in use is approximately 18 years (or 18 years behind the technology curve), there is a built-in cargo handling inefficiency which must adversely impact cargo handling operations.

The second factor, the size of the ship, relates to the increasing returns to scale in the handling per ton of cargo for larger ships. This type of result had been typically demonstrated for bulk cargoes and now was found to be true for breakbulk cargoes as well. The total time

required for handling such cargoes tended to increase with the size of the ship, but the time required to handle each ton of cargo tended to decrease. A perfect example of the applicability of ship size to the CS was the short term use of the President Adams, a C-5 ship, for Voyage #003 of FY83. She carried considerably more cargo and had a profit making voyage, but because she disrupted the cargo flow to the other CS ships and spent more time in port loading and off-loading, the resultant swings in the schedule could not be tolerated and her services were discontinued.

The negative coefficient of the third factor, the number of shipboard cranes, was felt to have more than one possible explanation. The authors of the study designed their productivity index to make shore cranes more efficient. Therefore, if a ship observed in the study had its own cranes and used them instead of a shore crane, that in itself would account for the finding. The authors point out that there is another possible explanation of the negative relationship between handling efficiency and the number of cranes and it relates to the size economies. As it turned out, the number of cranes was found to have a high correlation ($r = .7$) with the length of the ship and therefore the variable may just represent length. This can also be expected from normal design limitations such as the fact that hatches may not be opened through all the six walls of

a hold so that as holds and hatches both increase, the volume which must be accessed from any given point in the hatch is increased. As noted earlier, the CS ships in current use are considered self-sustaining and consequently are forced into "inefficient" operations when appropriate shore cranes, including fixed, floating, or gantry types, are either not available or not used.

The ratio of the number of hatches to holds, the fourth factor, also has implications for the handling efficiencies for CS ships. The results of this analysis suggests that general cargo liners with twin hatch designs do allow for easier access for the hooks, with fewer attendant setting-up operations within the hold. The Clipper Class ships currently in the CS inventory do have a twin hatch design for holds in the mid-section of the ship. This type of configuration should be encouraged within the framework of tradeoffs with potential other utilization of deck space.

The fifth and final significant factor was the proportion of tonnage carried in containers. As expected, containerization does clearly improve handling efficiency. The variable was significantly positive for the conventional cargo ship as well as for the all-ship sample (which included partial containerships). The containerized cargo carried by the CS ships fall primarily in the MSCVAN

category destined for Diego Garcia. It represents only about 3 to 10 percent in MTONS of CS cargo depending on the voyage. Most of the government containerized cargo booked by MTMC goes via commercial shippers under negotiated container cargo agreements.

2. Other Port Operation Considerations

The CS can be considered of minor importance to port operations in general. Yet as a significant portion of the MSC controlled fleet breakbulk capacity, it does impact certain ports. For instance, the MOTBA owns and operates Pier 7 (East and West) which has as its primary purpose the providing of services to ships carrying MSC booked cargo. Most of the functions, including stevedoring operations as well as crane operations and maintenance, are contracted out. This is typical of military cargo handling operations as directed by MTMC at ports or piers under their jurisdiction. The number and size of stevedore companies hiring unionized longshoremen have contracted as longshore labor requirements have dwindled due to containerization and other automated cargo handling techniques. Table V-IV shows the decrease in longshore labor just over the past ten years. The occupation has become so stagnant that entrance into the union in many cases depends solely on nepotism.

Of concern in this thesis is whether or not the decline in the number of longshoremen impacts the Combined

TABLE V-IV

LONGSHORE LABOR: AVERAGE MONTHLY EMPLOYMENT IN
FISCAL YEARS 1964-1981
[Data obtained from MARAD Annual Reports 1964-1981]

<u>FY</u>	<u>NUMBER</u>
1964	70,000 ¹
1965	70,000 ¹
1966	70,000 ¹
1967	70,000 ¹
1968	70,000 ¹
1969	68,700
1970	66,120
1971	65,530
1972	57,951
1973	64,708
1974	65,113
1975	63,725
1976	58,888
1977	56,515
1978	52,100
1979	49,103
1980	48,747
1981	46,245

¹Considered "normal" work force with a total of 88,000 - 95,000 actually available for work.

Service and how the existence of regular military breakbulk operations impacts the longshore industry. If one looks at the number of longshoremen employed (or unemployed) and the skill levels required, it appears that the military keeps a significant portion of the longshore work force at certain ports employed that would otherwise be laid off. The work force appears to be readily available, at least into the near future, if breakbulk shipping requirements increased. The group that is perhaps more significant to the Combined Service are the carpenters who actually secure the cargo in the holds using dunnage. These people are much more highly skilled and the availability of their services could be in jeopardy if breakbulk shipping continues to decline. These services are also contracted out at military terminals.

A side issue relates to the availability of suitable portside cargo handling equipment for normal breakbulk operations. For breakbulk cargo, there should be cranes, forklifts, dunnage, wire rope and chains for securing, and adequate covered storage for cargo. As containerized cargo requires quite different port support, it is important that breakbulk capabilities be kept available and maintained in good condition in designated stateside and overseas ports. A reasonably cost-effective way of ensuring continued capability is to productively employ the facilities by regularly routing breakbulk shipping to these ports.

Another side of peacetime breakbulk operations that often gets overlooked is the availability of breakbulk ships for military training. The Navy has only eight Reserve Cargo Handling Battalions that are under the jurisdiction of the Navy Cargo Handling and Port Group (NAVCHAPGRU) at Chatham Annex in Williamsburg, Virginia which has approximately 145 active duty personnel. The Reserve units are made up primarily of Storekeepers and Boatswain's Mates with some SEABEE ratings and administrative support ratings. The Army, on the other hand, has five active duty units called Terminal Service Companies assigned to major military ports. Each Company is authorized eight officers and 288 enlisted personnel. There are, in addition, eight Reserve Companies with similar numbers and types of personnel that regularly drill at their assigned mobilization ports. The Companies are oriented by their cargo handling equipment to either breakbulk or containers but can do both if necessary. They are equipped to move 1000 short tons of breakbulk cargo per day or 400-600 containers [Ref. 53].

C. MSC OVERSIGHT OF CONTROLLED DRY CARGO SHIPPING

1. Operating Guidance

Over the years, the MSC has developed numerous instructions to guide dry cargo operations and establish consistent policies for the three primary categories of dry

cargo vessels; the MSC Nucleus Cargo Ships (USNS), the Time-Chartered Ships of which the CS is a five-ship subset, and the General Agency Agreement (GAA) Ships under MARAD custody that are rarely used in peacetime. Those COMSC instructions which apply solely to dry cargo ships were incorporated into COMSC Instruction 3120.17; "Dry Cargo Ship Operating Instructions (CARGOPINS)" dated 24 January 1983. In addition to CARGOPINS guidance, a list of related COMSC instructions applicable to time charter breakbulk ships is included as Table V-V. The terms under which the chartered ships come within MSC control are contained within the respective charter parties that are entered into between MSC and the ship owners. The standard MSC Dry Cargo Time Charter Party (MSC Form 4330-2) is included as Appendix B.

2. Monitoring of Costs

As indicated in Chapter II, there are numerous givens that MSCPAC must factor into its CS cost function. That does not mean, however, that all fixed and variable costs cannot be monitored on a regular basis. Data can be extracted and/or summarized to support periodic management reviews that can result in decisions that improve efficiency. The major fixed cost is the contracted time charter cost that is made up primarily of manning and subsistence costs, vessel maintenance costs, insurance, and a management fee. The major variable cost is the voyage cost which is

TABLE V-V

COMSC INSTRUCTIONS APPLICABLE TO CHARTER SHIP OPERATIONS
[Ref. 53:2-5]

<u>COMSCINST</u>	<u>SUBJECT</u>
2000.1C	Procedures for Communicating with MSC MARISAT-Equipped Ships by Telephone
3000.1C	Ship Movements on the Outbreak of War or Upon Future Declaration of Emergency
3120.5C	Responsibilities of Subordinate Commands in Handling MSC-Chartered and General Agency Agreement (GAA) Dry Cargo Ships
3120.12B	Automated Mutual-Assistance Vessel Rescue (AMVER) System
3120.16A	Standards of Appearance
3121.1E	Operational Control Procedures for MSC-Controlled Ships (less tankers)
3121.5D	Voyage Description in Shipping Articles
3123.5G	MSC Movement Report Instructions
3123.6C	Pearrival Messages by MSC Voyage-Chartered, Time-Chartered and GAA Dry Cargo Ships; submissiol of
3123.7C	Casualty Reports by MSC Voyage-Chartered, Time-Chartered and GAA Dry Cargo Ships; submission of
3123.8A	Suez Canal Transit
3123.9	Panama Canal Transit
3130.1D	Assistance-At-Sea Missions Performed by MSC Ships; report of
3140.1F	Environmental Reports and Services

TABLE V-V (Continued)

<u>COMSCINST</u>	<u>SUBJECT</u>
3160.2C	Classified Nautical Chart and Publications for MSC Contract-Operated Tanker (USNS), MSC Chartered Ships, and GAA Ships
3840.1C	Information Collection by MSC Ships in Support of National Interests
4020.2E	Bunkering Instructions
4355.2C	Delivery, Redelivery and Joint Survey of MSC Time-Chartered Ships (except tankers); reports on
4610.29B	Operating and Administrative Procedures for MSC-Controlled Bulk Carriers (Coal Ships)
4610.32C	Cargo Ship Location, Status and Utilization Sub-System (CALSTAT) Reporting Instructions
4610.33B	MSC Cargo Ship In-Port Status Report
4650.2B	Passenger Booking and Reporting Procedures
4650.5B	Observers; Definition and Assignment of Aboard MSC Ships
4700.1D	Cleaning of Cargo Spaces in MSC Controlled Ships; MSC Policy Governing
4700.7B	Ships Permanently Assigned to MSC; Material and Machinery Operation Standards for
5112.1B	Mail for Merchant Crews Aboard Ships Operating for the Account of MSC
5420.2E	Salvage of Controlled Shipping; responsibility for
5440.1V	MSC Command Organization
5440.2H	Boundaries of MSC Area and Subarea Commands
5520.1	Barricaded Captor/Hostage Situations

TABLE V-V (Continued)

<u>COMSCINST</u>	<u>SUBJECT</u>
5800.2D	Waiver for Navigation and Vessel Inspection Laws and Regulations; procedures for
5840.2C	Procedures for Clearance of Ships with U.S. Customs
5890.1D	General Average and Salvage
6240.4C	MSC Environmental Protection and Enhancement Program; Policy, Procedures, and Assignment of Responsibilities for
8023.1F	Safety Regulations Governing the Handling and Transportation of Ammunition and Other Hazardous Cargoes
9010.1E	Ship Characteristics Cards; preparation and submission of
9170.1E	Testing of Cargo Gear
12410.3E	Small Arms Training

primarily made up of fuel charges, port charges, and canal tolls. An example of a voyage cost analysis including both fixed and variable costs is included as Appendix C. Other variable cost considerations involve off-hire periods, ROS periods, and voyage margins for delays due to weather or other unpredictable occurrences.

On-Hire/Off-Hire procedures exist to account for times when a vessel on time charter fails to perform in accordance with its contract. A vessel's mechanical equipment sometimes breaks down, whether it be the propulsion or electrical power generating units or the cargo handling gear. Diversions, for reason of medical necessity, such as to put an ailing crewmember ashore in an emergency are considered a failure to perform. Failures in hull structure, such as a crack in the vessel's bottom, often requires drydocking. During the period off the assigned task, the vessel is considered in a status of failure to perform. Certain information is required of the vessel's Master by the Dry Cargo Ship Operations Branch, in order to properly place the vessel off hire. Needed are actual times of the commencement of the failure to perform and the number of barrels of fuel aboard at that time. Likewise, times of return to normal assigned activity and the amount of fuel on board at that time are also required [Ref. 54]. Off-hire time is monitored very closely as even a prorated reduction

of per diem charges for a few hours off hire can result in significant dollar savings. The opportunity to put a time-charter ship in ROS when appropriate can also reduce costs. As noted earlier, after FY85 these reduced costs can no longer be charged to a CNO readiness account, but must be absorbed in an MSC readiness account.

3. Operational Initiatives to Improve CS Efficiency

As noted in the previous section, opportunities for the Combined Service to improve efficiency are tied to either changing the fixed costs (i.e., changing the number or type of the ship in the CS fleet) or changing the numerous variable costs. If one takes as a required mission performance standard, the requirement for a relatively consistent route structure and port call frequency of approximately 30 days, then there are various combinations of ship numbers, sizes, speeds and route structures that can meet minimum performance standards. The Combined Service manager since its inception has monitored cargo flows in and out of all the CS ports, noting not only overall utilization, but significant origin-destination pairs for certain categories of cargo. Analyses have been regularly performed to consider more cost effective routes and/or schedules. Additionally, analyses are performed by the Military Traffic Management Command under its functional responsibility as single manager for military traffic land transportation.

Some of the ongoing analyses with potential impact on CS operations are MSCPAC analyses of the effects of deleting the East Coast and/or Gulf Coast segments of the CS voyage. These analyses address identifiable costs specifically but also attempt to factor contingency requirements into a rational decision. MTMC is performing a series of studies called "CSM Ship vs Line-Haul." This series, still in draft form, compares costs of various scenarios to determine at what point minibridge options become more cost effective than the oceanborne shipping option. MTMC is also reviewing several other port mixes to best determine if reduction of port calls on the East Coast and the West Coast with more cargo sent by truck or rail to the ports remaining on the route would be cost effective. Reviewing for content these draft comparative cost analyses is beyond the scope of this thesis but it is appropriate to note that unless analyses of this nature are done as a truly joint MSC/MTMC venture, they will probably get lost in the political crossfire.

On a much smaller scale and with more immediate results, the CS schedule can be planned and executed incorporating minor changes within fairly short time horizons. There is flexibility to include mobilization exercise requirements in the schedule as well as to consider the shipping companies' overhaul and maintenance requirements. Opportune lifts can be made if cost effective or otherwise

required, and cargo can be diverted to another port for similar justification. The schedule is currently developed, monitored, and changed in a manual mode which makes it difficult to evaluate the secondary and tertiary impacts of a schedule change.

4. MSC Initiatives to Expand Dry Cargo Capacity

When President Nixon came into office in 1968 he called for a massive ship construction program to rebuild the aging and dwindling U.S. merchant fleet. The parameters of this program were reasonably well established:

- a. Three hundred ships were to be built in ten years, averaging thirty ships per year.
- b. Ships would be of standard design for multi-ship, multi-year procurement.
- c. A minimum of 15 percent of the export-import trade of the United States would move on U.S. ships.
- d. The U.S. bulk fleet would be included in the new program.

The three hundred ship program was envisioned in three parts:

- a. requirements and ship evaluation,
- b. engineering development, and
- c. ship construction [Ref. 55:32].

As noted in Chapter IV, this grandiose ten year plan begun with such high hopes, never really materialized in the form of substantial new merchant ship construction.

When it became obvious to military leaders that the promises of an upgraded merchant marine had turned out to be just promises, new sealift options began to be formulated that would reduce reliance on political intransigence. Three examples of ongoing MSC activities that will directly support contingency requirements and, at the same time, generate revenue and jobs for the U.S. maritime industry are as follows:

- a. a build-and-charter program,
- b. A convert-and-charter maritime prepositioning ship (MPS) program, and
- c. the acquisition and conversion of SL-7's [Ref. 22:26].

Simply stated, build-and-charter is a means of securing needed ships which are built and owned by private interests. The Navy specifies the type of ships needed (those not currently available in the merchant marine) and private investors arrange for construction on the basis of a Navy commitment to charter the ships. Once the ships are operating, the Navy pays the cost of the service provided at a negotiated charter rate. The rate covers the cost of construction and financing, plus a reasonable profit for the owners. To date MSC has acquired the long-term use of 29 ships this way (28 tankers and one RO/RO). In January 1982, MSC issued a Request for Proposal for five new T-5 replacement tankers. These 25,000 to 30,000 DWT ships are

to be built in U.S. shipyards and delivered to owners for MSC use under charter in 1986 [Ref. 22:26].

Convert-and-charter is another program by which both industry and the Navy profit. There are currently 17 chartered merchant ships with civilian crews on station in the Indian Ocean as part of the Near Term Prepositioned Force (NTPF). The Military Sealift Command is currently replacing elements of the NTPF with an expanded Maritime Prepositioned Ship Program. Originally MSC had planned to acquire 12 multipurpose ships through a combination of new construction and conversion, but budget constraints resulted in the decision to convert-and-charter. Contracts were awarded in June 1983 for construction and/or conversion of 13 ships to RO/RO configuration. These ships will then be time chartered to MSC for up to 25 years.

The third program, the acquisition and conversion of SL-7's, began with the purchase of eight large container-ships from Sea-Land Industries, Inc. in 1981 and 1982. At 33-knots, these SL-7's are among the fastest cargo ships in the world and, as part of the nucleus fleet, will give MSC much-needed flexibility. They can carry tremendous amounts of cargo and after conversion to the RO/RO configuration, will be able to load or discharge in one day the majority of the unit equipment (tanks, artillery, wheeled vehicles, etc.) needed for two Army heavy mechanized or armored

divisions [Ref. 22:27]. Four SL-7's have been converted and funds have just been released to convert the remaining four ships currently in MARAD custody.

All of these initiatives, including support for the build up of the RRF and SRP, fall under the generic heading of sealift enhancement programs that are getting much needed attention. No longer is sealift's role in strategic mobility restricted to the long-term reinforcement of deployed troops. It is now an essential element of all strategic mobility plans and this has been and continues to be reflected in funding. There was more money for sealift enhancement programs in the FY82 budget and programmed by the Navy in the follow-on four years of the Five Year Defense Plan than in all the years since World War II [Ref. 56:3]. Whether or not this increase in both interest and funding will be sufficient to make up for years of benign neglect has yet to be seen.

VI. SUMMARY AND CONCLUSIONS

A. GENERAL

An effort has been made in this study to put the Combined Service into context by reviewing this five ship operation as a component of the MSC capacity for providing breakbulk shipping. The MSC controlled fleet must, in turn, be viewed from the perspective of total U.S. flag dry cargo capabilities and ultimately as a part of world dry cargo shipping. Issues impacting the CS directly or indirectly include breakbulk shipping requirements in peacetime as well as various wartime scenarios and the excess capacity that MSC in general and CS specifically are expected to provide to meet surge requirements. Other issues relate to changes in technology, military strategy, national goals, and international politics. There is obviously nothing static about this environment and, consequently, the CS must be constantly reviewed to ensure its mission remains valid and its performance meets applicable standards. Within that review framework, alternatives for moving cargo within and outside MSC must be considered including all relevant and related cargo handling impacts.

B. SUMMARY

The Combined Service, as it was established in June 1979, resulted from a recognition on the part of the

Commander, Military Sealift Command, and to varying degrees, his area commanders, that a scheduled breakbulk shipping operation tying the East Coast, both inbound and outbound, to the Far East via the Gulf Coast and West Coast would be beneficial to the shipper services. Based on this conviction, it was assumed that cargo currently being lost to commercial shipping would flow to the CS, thus productively employing existing MSC charter ships and yet not officially "competing" with the commercial carriers. COMSCPAC was designated the Combined Service manager and the MSCPAC Transportation Office (P-3T) was delegated management authority including the functions of scheduling, monitoring cargo flows and associated costs, and continuous evaluation of voyages. As an ongoing operation, problems are identified and management or operationally oriented solutions are applied on a regular basis.

Because the CS has been justified in part by its role as a provider of surge capability (i.e., as part of the "warm" industrial base), that issue was reviewed. Chapter III included a brief history of the U.S. Merchant Marine to give perspective to the condition of U.S. oceanborne shipping today. The CS represents U.S. breakbulk shipping assets and it was significant to describe the dwindling U.S. role in breakbulk shipping although a world market continues to exist. The continuing requirement to move military

breakbulk cargo in a mobilization scenario was also addressed. When considering breakbulk shipping assets in a full to total mobilization environment, there are world shipping markets to draw on. However, issues of availability in another "proxy" war environment (such as Korea or Vietnam) where this country maintains a "guns and butter" mentality, was described as more difficult to qualify. The concern that militarily suitable ships may not be available when needed was discussed in a section on modern trends in dry cargo ship design and capabilities. It was stressed that MSC can influence those designs and better utilize the newer technologies in support of their mission.

Less tangible influences on decisions concerning the Combined Service can be as important if not more important than physical considerations. Chapter IV was used to summarize maritime politics as represented by major U.S. legislation, changing international policies, shifting domestic competitive environments and, more specifically, major changes in mobilization thinking.

The Merchant Marine Act of 1970 was chosen as a focal point because it was a fairly recent and comprehensive piece of legislation with specific goals that could then be analyzed ex post facto to exemplify problems typical to the legislation of progress. This summary was then related to legislation under current consideration to help anticipate

potential pitfalls and to glean an understanding of the economic implications of politically inspired "solutions."

A quick review of the UNCTAD Code of Conduct for Liner Conferences was included because breakbulk shipping is a worldwide enterprise generally associated with the liner trade. If one subscribes to the syllogism "investment follows cargo" then the UNCTAD Code that allocates trade vis a vis a cargo preference scheme is of particular concern to the U.S. flag fleet. The U.S. has not signed the Code while major trading partners have just started functioning within its guidelines. There are sure to be significant shifts in world flag fleets, not only in number but in the types of ships that are suitable to support cargo sharing between specific trading partners. As shipping conferences adjust their route structures and tariffs, the U.S. may have to relax its "free trade" posture.

The domestic transportation scene was included as significant because recent deregulation of the trucking and railroad industries has impacted their competitive position with respect to certain oceanborne cargo. Land transportation options that were not cost effective several years ago are now being reconsidered. Possible impacts on the CS schedule are closely related to this rapidly changing environment.

Changes in strategic planning with the associated changes in total sealift requirements, surge versus sustainability capabilities, and the role of prepositioned war supplies, have dramatically altered concepts of sealift readiness. The justification of the CS as a segment of the MSC breakbulk sealift capability must be affected by these shifting scenarios. Because shipping assets should not be considered apart from their attendant manpower requirements and port throughput capabilities, these segments of the shipping base were included in the discussion of mobilization impacts on sealift readiness.

Chapter IV also included a discussion of breakbulk cargo handling capabilities in a wartime scenario by referencing the Logistics-Over-the-Shore (LOTS) test and evaluations in 1976. The five LOTS tests and the still ongoing JLOTS II tests addressed the problem of how to load and discharge outsized and containerized cargo in an environment where no port facilities were available and stressed the importance military planners were placing on the use of containerized military cargo. One of the primary outcomes of these series of tests was the decision to procure eleven crane ships (TACSS - six for the Navy and five for the Army) that would travel with a container or breakbulk ship to offload its cargo more flexibly and efficiently than making the ships self-sustaining with their own cranes or derricks.

The purpose of Chapter V was to pull together much of the general material in the previous chapters and relate it to MSC dry cargo shipping in general and specifically to the CS wherever possible. The actual cargo carried was discussed along with special issues such as the CS as a special lift resource and a provider of not otherwise available service.

Because breakbulk shipping has unique cargo handling requirements, the impact of military shipping on military ports, was discussed. The justification for the underutilization of military port capacity is comparable to the historical underutilization of shipping assets; to maintain a surge capability. Consequently, there exists a need for constant dialogue between MSC and MTMC to ensure that the decisions of one have a minimum adverse impact on the other.

The MSC oversight of the controlled dry cargo fleet was briefly discussed to explain the administrative environment and, specifically, the terms under which the chartered ships come within MSC control. Ongoing operational initiatives to improve CS efficiency were mentioned to better understand the current cargo lift options available to CS managers. A final section on MSC initiatives to expand total dry cargo shipping capacity was included to see what the future may bring.

C. CONCLUSIONS

Because the purpose of this thesis was to put the Combined Service scheduled breakbulk shipping operation into context, or in other words, integrate its operations into the rest of the shipping industry, it is difficult to point to specific conclusions. Instead, the conclusions will be comments on several trends noted during the research. These trends will then be related to their potential impact on the Combined Service. The trends fall into five general categories:

- a. the shifting of assets for surge capability;
- b. the justification of controlled fleet ships and route structures based on projected cargo requirements (utilization);
- c. changes in mobilization cargo handling technology;
- d. the shifting domestic transportation scene; and
- e. the aggressive international shipping politics arena.

The first refers to the recent emphasis on the prepositioning of military support equipment at sea. The NTPF will be succeeded by the Maritime Prepositioning Ships (MPS) Program which will require conversion or construction of thirteen T-AKX ships. These dry cargo ships will be stationed in strategic spots around the world. In addition, the MSC Fast Sealift Program, consisting of the eight converted SL-7s, will be stationed in the U.S., manned by civilians, and initially dedicated to lifting Army

divisions. They can be on station almost anywhere in two weeks or less [Ref. 56:4]. Coupled with the recent decision to discontinue putting nucleus ships into Reduced Operating Status when no cargo is anticipated and the concurrent support for upgrading the Ready Reserve Force, the trend appears to be away from using the time charter assets as a surge capability.

This leads directly into the second trend and that is toward justification of both route structures and number of MSC breakbulk ships solely on projected peacetime cargo lift requirements submitted annually by the shipper services. The Combined Service has been justified on the basis mission accomplishment, not cost. Consequently, utilization has become the primary criterion for monitoring effectiveness. The documented fact of low utilization on several segments of the route has been of continuing concern to the CS management and will probably result in the dropping of certain port calls from the regular itinerary. By doing so, there may be the need to slightly redefine the CS mission or confront the risk that the entire operation will become more and more justified on cost alone. This could ultimately destroy the concept of a scheduled service altogether.

The fact that containerization of military cargo is here to stay cannot be discounted and this rapid change in technology is included as a third trend. It is totally

unrealistic for the almost entirely containerized peacetime transport of dry cargo to shift to the breakbulk mode for sea transport in a mobilization scenario. The studies beginning with the LOTS series in 1975 and continuing into the JLOTS II series still ongoing have helped definitize the problem of discharging containers and establishing the associated infrastructure necessary for efficient utilization of containerized military equipment. Certainly, all the problems have not been solved but the trend appears towards accommodating the changing cargo carrying technologies by developing new concepts in military cargo handling. However, as military cargo becomes more "containerizable," the need for breakbulk ships may decrease but will never disappear. It is estimated that 10 to 15 percent of military dry cargo will never be container suitable. New requirements may also develop for breakbulk ships as they assist in carrying outsized equipment necessary to establish container discharge facilities in undeveloped areas.

Another trend impacting breakbulk shipping from a more routine business perspective is the changing domestic transportation scene. The growth of intermodalism in the railroad and trucking industry, particularly the growth in domestic containerization, can only mean increased competition for traditionally breakbulk cargo in the intercoastal and intracoastal trade. The growing sophistication of

minibridge, microbridge, and landbridge operations with their convenient single tariff structures will also continue cutting into the oceanborne shipping market. As these markets are encroached upon and breakbulk markets decrease in the U.S. oceanborne trades, the number of U.S. flag breakbulk ships will probably decrease even more rapidly. This could soon endanger the pool of ships available for charter hire.

The final trend relates to the understanding that the United States functions in a world economy and political environment. These factors have substantial impacts on perceptions of oceanborne shipping as either a national economic and political asset or as a purely commercial enterprise.

Where other countries have made it clear that their merchant fleets are part of an overall national policy, the United States remains dominated by special interest groups who directly or indirectly interfere with the development of a strong national oceanborne shipping policy. All the while, our cargoes are being carried increasingly by foreign flag vessels including those of state-owned fleets of potential adversaries. The very ships which would be employed as a naval auxiliary of an enemy in time of war are financed by our peacetime cargoes, and allowed to drive our U.S. flag ships, and the ships of our allies, out of our

U.S. trades [Ref. 57:17]. There currently appears to be some serious review of U.S. traditional free trade concepts that, after consultation with our allies, may result in some fundamental changes in maritime policy. The long-range objective is to ensure the availability of cargoes for U.S. flag carriers, and for the flag carriers of our allies, in our trades, in order that the trades remain "free."

The implied threat associated with the implementation of the UNCTAD Code is pushing the U.S. toward the establishment of bilateral trade agreements. The realization that the rest of the world is not particularly concerned about free trade has been difficult for the U.S. to deal with. But unless decision makers are willing to face the reality that the U.S. can no longer set world policy but instead must adapt to it, this country could lose what little merchant fleet it has left.

These are the five most significant trends that, by constantly influencing the external environment of the Combined Service, indirectly impact the performance of its current and future missions. Decision makers within the MSC organization must be cognizant of these trends and be aware of their potential impacts in order to continue to make intelligent decisions concerning breakbulk requirements in general and the Combined Service in particular.

APPENDIX A

DRY CARGO MOVED BY MSC IN FY 1975 AND 1981

ROUTE AND COMMODITY	FY 1975						
	MSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (GEL)	OTHER COMMERCIAL		TOTAL
					BREAKBULK	CONTAINER	
TOTAL OUTBOUND EAST COAST							
HOUSEHOLD GOODS	5,246	-	4,194	8,973	11,582	79,202	109,197
REEFER	1,033	-	4,680	3,933	3,658	179,999	193,303
BULK	-	-	626,266	-	-	-	626,266
PRIVATELY OWNED VEHICLES	24,627	-	24,732	24,732	28,713	171,839	341,234
AMMUNITION/HAZARDOUS	8,618	-	91,323	4,878	10,178	-	214,852
GENERAL LESS HH. GOODS	58,383	-	191,178	64,061	50,992	1,688,118	1,936,111
TRAILERS CARGO CARRYING	-	-	74,557	-	-	-	14
SPECIAL	65,578	-	14	13,847	62,969	10,257	313,693
AIRCRAFT	676	-	161,847	-	2,203	-	9,255
TOTAL	164,161	-	6,376	119,619	170,295	2,129,415	3,743,925
			1,160,435				
ROUTE AND COMMODITY	FY 1981						
	MSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GEL)	OTHER COMMERCIAL		TOTAL
					BREAKBULK	CONTAINER	
TOTAL OUTBOUND EAST COAST							
HOUSEHOLD GOODS	199	717	47	10,585	165	28,284	40,000
REEFER	1,081	1,453	-	20,572	2,006	194,966	220,080
BULK	-	444,127	73	-	77	632	444,909
PRIVATELY OWNED VEHICLES	5,849	1,924	76,830	37,126	7,830	157,542	287,104
AMMUNITION/HAZARDOUS	596	113	104,846	843	2,008	2,925	111,334
RADIOACTIVE WASTE	-	-	4	-	-	-	5
GENERAL LESS HH. GOODS	23,440	12,607	64,467	112,866	22,777	1,680,142	1,916,301
TRAILERS CARGO CARRYING	-	-	196	-	-	-	196
SPECIAL	17,281	7,779	232,163	8,647	20,544	10,112	296,528
AIRCRAFT	51	-	-	2	-	158	212
TOTAL	48,500	468,723	478,630	190,644	55,410	2,074,764	3,316,675

FY 1975

ROUTE AND COMMODITY	NSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER BREAKBULK	COMMERCIAL CONTAINER	TOTAL
TOTAL OUTBOUND GULF COAST							
HOUSEHOLD GOODS	-	-	-	340	10,027	30,710	41,077
REEFER	-	-	34	717	13,255	648	14,674
PRIVATELY OWNED VEHICLES	2,077	-	3,048	1,252	17,224	11,532	35,133
AMMUNITION/HAZARDOUS	-	-	1,054	3	24	9	1,090
GENERAL LESS IRL. GOODS	7,066	-	25,871	6,743	74,335	115,130	229,145
TRAILERS CARGO CARRYING	10	-	-	-	-	-	10
SPECIAL	11,593	-	48,137	5,723	149,415	321	215,189
TOTAL	20,746	-	78,164	14,778	264,280	158,350	536,318

FY 1981

ROUTE AND COMMODITY	NSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER BREAKBULK	COMMERCIAL CONTAINER	TOTAL
TOTAL OUTBOUND GULF COAST							
HOUSEHOLD GOODS	-	-	135	635	436	8,876	10,083
REEFER	-	-	-	-	6,599	1,192	7,791
BULK	-	-	-	-	-	10	10
PRIVATELY OWNED VEHICLES	-	-	6,637	3,497	3,736	22,426	36,298
AMMUNITION/HAZARDOUS	-	-	147	10	4	99	261
RADIOACTIVE WASTE	-	-	1	-	-	-	1
GENERAL LESS IRL. GOODS	56	-	47,184	7,137	6,657	92,135	153,170
SPECIAL	8,543	-	217,614	4,819	29,774	2,405	263,156
TOTAL	8,599	-	271,720	16,099	47,208	127,145	470,773

FY 1975

ROUTE AND COMMODITY	MSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (GEL)	OTHER COMMERCIAL BREAKBULK	CONTAINER	TOTAL
TOTAL OUTBOUND WEST COAST							
HOUSEHOLD GOODS	119	-	596	4,608	148	47,434	52,905
REEFER	1,369	-	1,206	32,709	156	170,286	205,726
PRIVATELY OWNED VEHICLES	1,770	-	6,497	39,911	2,950	143,192	194,320
AMMUNITION/HAZARDOUS	46,373	-	122,657	6	104	-	169,140
GENERAL LESS HH. GOODS	43,753	-	123,612	181,546	60,535	1,228,068	1,637,514
SPECIAL	10,652	-	38,933	16,702	17,327	13,721	97,335
AIRCRAFT	-	-	14,681	-	544	-	15,225
TOTAL	104,036	-	308,182	275,482	81,764	1,602,701	2,372,165

FY 1981

ROUTE AND COMMODITY	MSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GEL)	OTHER COMMERCIAL BREAKBULK	CONTAINER	TOTAL
TOTAL OUTBOUND WEST COAST							
HOUSEHOLD GOODS	222	-	495	7,773	16	51,531	63,038
REEFER	620	-	420	31,699	686	145,391	178,814
BULK	1,476	-	-	38	164	1,303	1,506
PRIVATELY OWNED VEHICLES	150	-	768	80,892	7,347	64,601	155,084
AMMUNITION/HAZARDOUS	-	-	41,457	957	347	1,408	85,633
RADIOACTIVE WASTE	-	-	35	6	-	15	341
GENERAL LESS HH. GOODS	16,171	22,239	90,838	275,750	8,499	935,691	1,103,876
SPECIAL	15,103	-	38,182	5,011	12,383	15,171	85,850
AIRCRAFT	-	-	6,912	-	-	-	6,912
TOTAL	33,742	22,239	179,107	402,126	29,441	1,218,108	1,884,767

ROUTE AND COMMODITY	FY 1975						TOTAL
	NSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL		
					BREAKBULK	CONTAINER	
TOTAL INBOUND EAST COAST							
HOUSEHOLD GOODS	9,619	-	44,258	6,450	15,957	133,863	210,147
REEFER	-	-	-	75	-	-	75
PRIVATELY OWNED VEHICLES	24,399	-	96,268	8,298	17,514	116,532	263,011
AMMUNITION/HAZARDOUS	1,519	-	34,616	-	2,083	-	38,218
GENERAL LESS HH. GOODS	10,177	-	56,705	5,653	5,232	54,149	131,916
SPECIAL	11,388	-	58,567	1,817	19,579	974	92,325
AIRCRAFT	-	-	3,029	-	-	-	3,029
TOTAL	57,102	-	293,443	22,293	60,365	305,518	738,721

ROUTE AND COMMODITY	MSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL		TOTAL
					BREAKBULK	CONTAINER	
TOTAL INBOUND EAST COAST							
HOUSEHOLD GOODS	1,997	688	36,535	8,625	363	29,433	77,643
REEFER	-	26	-	36	-	43	105
BULK	-	-	-	-	-	-	-
PRIVATELY OWNED VEHICLES	10,202	1,278	150,629	24,342	1,008	77,281	264,742
AMMUNITION/HAZARDOUS	-	13	6,883	41	-	4	6,942
RADIOACTIVE WASTE	-	-	7	-	-	14	22
GENERAL LESS HH. GOODS	3,467	8,168	51,409	9,648	5,857	21,968	100,520
TRAILERS CARGO CARRYING	-	-	-	-	22	-	22
SPECIAL	672	3,238	21,660	350	3,201	616	29,739
AIRCRAFT	-	335	-	-	-	-	335
TOTAL	16,340	13,749	267,125	43,044	10,452	129,361	480,074

ROUTE AND COMMODITY	NSC NUCLEUS	GSA	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	FY 1975		TOTAL
					BREAKBULK	OTHER COMMERCIAL CONTAINER	
TOTAL INBOUND GULF COAST							
HOUSEHOLD GOODS	176	-	23,702	19	14,092	17,993	55,982
PRIVATELY OWNED VEHICLES	2,223	-	11,548	342	11,587	8,728	34,428
AMMUNITION/HAZARDOUS	11	-	103	-	1	-	115
RADIOACTIVE WASTE	-	-	10	-	-	-	10
GENERAL LESS HH. GOODS	9,101	-	18,749	58	9,319	6,560	43,787
SPECIAL	27,795	-	32,736	231	28,248	41	89,051
AIRCRAFT	-	-	6,239	-	-	-	6,239
TOTAL	39,306	-	93,087	650	63,247	33,322	229,612
FY 1981							
ROUTE AND COMMODITY	NSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	BREAKBULK	OTHER COMMERCIAL CONTAINER	TOTAL
TOTAL INBOUND GULF COAST							
HOUSEHOLD GOODS	567	-	13,925	304	1,291	3,865	19,952
BULK	-	-	545	-	-	-	545
PRIVATELY OWNED VEHICLES	1,308	-	23,143	3,134	5,094	19,168	51,847
AMMUNITION/HAZARDOUS	-	-	2	-	-	-	2
GENERAL LESS HH. GOODS	21	2,967	10,511	2,074	2,642	344	18,559
SPECIAL	5,495	4,618	45,459	158	1,261	42	57,033
TOTAL	7,393	7,586	93,588	5,671	10,289	23,419	147,938

FY 1975

ROUTE AND COMMODITY	MSC NUCLEUS	GVA	TIME AND VOYAGE CHARTER	BERTH TERM (GEL)	OTHER COMMERCIAL BREAKBULK CONTAINER	TOTAL
TOTAL INBOUND WEST COAST						
HOUSEHOLD GOODS	7,840	-	9,961	2,348	1,949	108,917
REEFER	-	-	6	4	4	39
PRIVATELY OWNED VEHICLES	5,522	-	12,580	30,513	2,060	132,992
AMMUNITION/HAZARDOUS	1,154	-	53,178	-	-	54,332
RADIOACTIVE MATERIAL	1,080	-	2	-	-	1,082
GENERAL LESS HH. GOODS	25,506	-	43,808	15,951	3,668	153,365
SPECIAL	12,186	-	21,771	749	6,199	41,601
AIRCRAFT	1	-	3,513	-	-	3,514
TOTAL	53,289	-	144,819	49,565	13,880	495,842

FY 1981

ROUTE AND COMMODITY	MSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GEL)	OTHER COMMERCIAL BREAKBULK CONTAINER	TOTAL
TOTAL INBOUND WEST COAST						
HOUSEHOLD GOODS	-	-	30,088	7,044	40	108,535
REEFER	2	-	5	-	-	7
BULK	-	-	-	-	-	9
PRIVATELY OWNED VEHICLES	2,736	-	18,315	85,511	412	152,866
AMMUNITION/HAZARDOUS	116	-	2,182	-	-	2,321
RADIOACTIVE WASTE	5	-	206	217	-	428
GENERAL LESS HH. GOODS	1,158	-	28,337	1,346	157	48,020
SPECIAL	3,725	-	10,698	287	70	19,987
AIRCRAFT	-	-	6	-	-	1,002
TOTAL	7,742	-	89,837	94,405	679	333,175

ROUTE AND COMMODITY	FY 1975						TOTAL
	NSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL		
					BREAKBULK	CONTAINER	
TOTAL COMUS OUTBOUND							
HOUSEHOLD GOODS	5,365	-	4,790	13,921	21,757	157,346	203,179
REEFER	2,402	-	5,940	37,359	17,069	350,933	413,703
BULK	-	-	626,266	-	-	-	626,266
PRIVATELY OWNED VEHICLES	28,474	-	100,868	65,895	48,887	326,563	570,687
AMMUNITION/HAZARDOUS	54,991	-	314,889	4,887	10,306	9	385,082
GENERAL LESS IRL. GOODS	109,202	-	224,040	252,350	185,862	3,031,316	3,802,770
TRAILERS CARGO CARRYING	10	-	14	-	-	-	24
SPECIAL	87,823	-	248,917	35,467	229,711	24,299	626,217
AIRCRAFT	676	-	21,057	-	2,747	-	24,480
TOTAL	288,943	-	1,546,781	409,879	516,339	3,890,466	6,652,408
FY 1981							
ROUTE AND COMMODITY	NSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL BREAKBULK	CONTAINER	TOTAL
TOTAL COMUS OUTBOUND							
HOUSEHOLD GOODS	421	717	678	18,994	618	91,691	113,122
REEFER	1,700	1,453	419	52,270	9,291	341,548	406,686
BULK	-	444,127	73	38	240	1,945	446,426
PRIVATELY OWNED VEHICLES	7,326	1,924	84,236	121,516	18,913	244,570	478,486
AMMUNITION/HAZARDOUS	746	113	146,451	1,811	2,360	4,433	155,915
RADIOACTIVE WASTE	-	-	40	6	-	15	61
GENERAL LESS IRL. GOODS	39,667	34,651	202,685	395,752	37,933	2,733,862	3,444,573
TRAILERS CARGO CARRYING	-	-	196	-	-	-	196
SPECIAL	40,927	7,779	487,960	18,478	62,702	27,690	645,537
AIRCRAFT	51	-	6,911	2	-	156	7,122
TOTAL	90,842	490,767	929,653	608,871	132,060	3,445,934	5,698,129

ROUTE AND COMMODITY	NSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL		TOTAL
					BREAKBULK	CONTAINER	
TOTAL COMUS INBOUND							
HOUSEHOLD GOODS	17,635	-	77,921	8,817	31,998	238,675	375,046
REEFER	-	-	6	79	4	25	114
PRIVATELY OWNED VEHICLES	32,144	-	120,396	39,153	31,161	207,577	430,431
AMMUNITION/HAZARDOUS	2,684	-	87,897	-	2,084	-	92,665
RADIOACTIVE WASTE	1,080	-	12	-	-	-	1,092
GENERAL LESS IRI. GOODS	44,784	-	119,262	21,662	18,219	125,141	329,068
SPECIAL	51,369	-	118,074	2,797	54,026	1,711	222,977
AIRCRAFT	1	-	12,781	-	-	-	12,782
TOTAL	149,597	-	531,349	72,508	137,492	573,129	1,464,175

ROUTE AND COMMODITY	NSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL		TOTAL
					BREAKBULK	CONTAINER	
TOTAL COMUS INBOUND							
HOUSEHOLD GOODS	2,565	688	80,548	15,974	1,695	104,661	206,403
REEFER	2	26	5	36	-	43	113
BULK	-	-	545	-	-	9	656
PRIVATELY OWNED VEHICLES	14,247	1,278	192,087	112,988	6,397	142,458	469,457
AMMUNITION/HAZARDOUS	116	13	9,068	41	-	27	9,266
RADIOACTIVE WASTE	4	-	213	217	-	14	451
GENERAL LESS IRI. GOODS	4,647	11,136	90,257	13,067	8,658	39,334	167,102
TRAILERS CARGO CARRYING	-	-	-	-	22	-	22
SPECIAL	9,892	7,856	77,818	796	4,532	5,867	106,763
AIRCRAFT	-	335	5	-	-	996	1,337
TOTAL	31,475	21,335	450,550	143,120	21,304	293,412	961,570

FY 1975

ROUTE AND COMMODITY	NSC NUCLEUS	GNA	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL BREAKBULK CONTAINER	TOTAL
TOTAL OTHER AREAS						
HOUSEHOLD GOODS	5,700	-	13,750	10,506	3,909	41,547
REEFER	192	-	731	1,863	81	3,514
PRIVATELY OWNED VEHICLES	3,916	-	8,824	17,679	2,611	35,900
AMMUNITION/HAZARDOUS	26,730	-	153,346	9,448	3	189,527
RADIOACTIVE WASTE	-	-	-	177	-	177
GENERAL LESS HH. GOODS	53,824	-	174,538	59,459	13,084	382,715
TRAILERS CARGO CARRYING	-	-	-	228	-	228
SPECIAL	51,083	-	293,696	65,088	9,218	419,890
AIRCRAFT	-	-	675	1,277	-	1,952
TOTAL	141,445	-	645,560	165,725	28,906	1,075,510

FY 1981

ROUTE AND COMMODITY	NSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (GBL)	OTHER COMMERCIAL BREAKBULK CONTAINER	TOTAL
TOTAL OTHER AREAS						
HOUSEHOLD GOODS	155	44	19,714	5,055	202	30,741
REEFER	1,574	518	424	1,335	-	4,011
BULK	-	15	15	19	-	60
PRIVATELY OWNED VEHICLES	368	1,629	8,697	9,238	1,211	22,561
AMMUNITION/HAZARDOUS	133	2,669	19,860	2,328	-	24,994
RADIOACTIVE WASTE	-	-	3	-	-	3
GENERAL LESS HH. GOODS	27,798	5,846	42,297	52,722	135	195,259
TRAILERS CARGO CARRYING	-	3,950	-	18,728	70,957	93,636
SPECIAL	91,334	50,936	84,566	23,509	4,294	255,659
AIRCRAFT	865	-	653	-	4,720	6,239
TOTAL	122,228	65,612	176,232	112,938	81,522	633,163

ROUTE AND COMMODITY	NSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (GRL)	OTHER COMMERCIAL		TOTAL
					BREAKBULK	CONTAINER	
FY 1975							
TOTAL COASTWISE							
HOUSEHOLD GOODS	24	-	-	12	-	-	36
PRIVATELY OWNED VEHICLES	1,087	-	3,514	572	-	-	5,173
AMMUNITION/HAZARDOUS	5	-	-	-	-	-	5
GENERAL LESS HH. GOODS	5,167	-	4,327	2	-	-	9,496
SPECIAL	1,589	-	3,193	-	-	-	4,782
AIRCRAFT	1,370	-	1,451	-	-	-	2,821
TOTAL	9,242	-	12,485	586	-	-	22,313
FY 1981							
TOTAL COASTWISE							
HOUSEHOLD GOODS	-	-	126	-	-	-	126
REEFER	641	-	-	-	-	-	641
PRIVATELY OWNED VEHICLES	42	-	3,746	-	975	-	4,763
AMMUNITION/HAZARDOUS	336	-	2	-	-	-	338
GENERAL LESS HH. GOODS	1,814	-	3,435	26	514	103	5,894
SPECIAL	-	-	5,471	-	-	-	5,471
AIRCRAFT	-	-	639	-	-	-	639
TOTAL	2,834	-	13,422	26	1,489	103	17,875

FY 1975

ROUTE AND COMMODITY	MSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (CBL)	OTHER COMMERCIAL BREAKBULK	CONTAINER	TOTAL
TOTAL INTERCOASTAL	-	-	130	-	-	-	130
HOUSEHOLD GOODS	3,703	-	3,050	4,779	-	-	11,532
PRIVATELY OWNED VEHICLES	-	-	21	-	-	-	21
AMMUNITION/HAZARDOUS	805	-	-	-	-	-	805
RADIOACTIVE WASTE	310	-	-	18	-	35	4,663
GENERAL LESS IHL. GOODS	1,243	-	4,300	-	-	-	7,805
SPECIAL	2,515	-	6,562	-	-	-	3,837
AIRCRAFT	8,576	-	1,322	-	-	-	28,795
TOTAL	-	-	15,385	4,797	-	35	-

FY 1981

ROUTE AND COMMODITY	MSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (CBL)	OTHER COMMERCIAL BREAKBULK	CONTAINER	TOTAL
TOTAL INTERCOASTAL	-	-	52	-	-	-	52
HOUSEHOLD GOODS	-	-	5,405	9,219	35	314	14,975
PRIVATELY OWNED VEHICLES	-	-	1	-	-	-	1
AMMUNITION/HAZARDOUS	-	-	-	-	-	-	-
RADIOACTIVE WASTE	-	-	-	-	-	-	-
GENERAL LESS IHL. GOODS	-	-	1,872	28	-	-	1,900
SPECIAL	-	-	7,797	-	-	-	7,797
AIRCRAFT	-	-	123	-	-	-	123
TOTAL	-	-	15,252	9,247	35	314	24,850

FY 1975

ROUTE AND COMMODITY	MSC NUCLEUS	GAA	TIME AND VOYAGE CHARTER	BERTH TERM (CBL)	OTHER COMMERCIAL BREAKBULK CONTAINER	TOTAL
TOTAL MSC CARGO LIST						
HOUSEHOLD GOODS	28,724	-	96,591	33,256	57,664	619,938
REEFER	2,594	-	6,677	39,301	17,154	417,331
BULK	-	-	626,266	-	-	626,266
PRIVATELY OWNED VEHICLES	69,324	-	236,652	128,078	82,659	1,053,723
AMMUNITION/HAZARDOUS	84,410	-	556,153	14,335	12,393	667,300
RADIOACTIVE WASTE	1,885	-	12	177	-	2,074
GENERAL LESS HH. GOODS	213,287	-	526,467	333,491	217,165	4,528,712
TRAILERS CARGO CARRYING	10	-	14	228	-	252
SPECIAL	193,107	-	665,442	103,352	292,955	1,281,671
AIRCRAFT	4,562	-	37,286	1,277	2,747	45,872
TOTAL	597,903	-	2,751,560	653,495	682,737	9,243,139

FY 1981

ROUTE AND COMMODITY	MSC NUCLEUS	SPECIAL CHARTER	TIME AND VOYAGE CHARTER	BERTH TERM (CBL)	OTHER COMMERCIAL BREAKBULK CONTAINER	TOTAL
TOTAL MSC CARGO LIST						
HOUSEHOLD GOODS	3,142	1,450	101,120	40,024	2,516	350,175
REEFER	3,918	1,998	849	53,642	9,291	411,452
BULK	-	444,143	615	57	240	447,041
PRIVATELY OWNED VEHICLES	21,983	4,813	294,173	252,962	388,758	990,243
AMMUNITION/HAZARDOUS	1,332	2,796	175,383	4,181	2,360	190,514
RADIOACTIVE WASTE	4	-	256	223	-	515
GENERAL LESS HH. GOODS	69,865	51,634	340,548	461,597	2,841,416	3,812,922
TRAILERS CARGO CARRYING	-	3,950	196	18,728	70,979	93,854
SPECIAL	127,764	66,572	656,669	42,783	71,528	999,385
AIRCRAFT	916	335	8,333	2	4,720	1,153
TOTAL	228,927	577,715	1,578,166	874,204	236,413	7,311,568

APPENDIX B

TIME CHARTER PARTY FOR MSC DRY CARGO
[From COMSCINST 3120.17 dated 24 January 1983]

DEPARTMENT OF THE NAVY
MILITARY SEALIFT COMMAND
WASHINGTON, D.C. 20390

CONTRACT NO.

TIME CHARTER PARTY
MSC DRY CARGO

CONTRACTOR AND ADDRESS:

CONTRACT FOR: TIME CHARTER OF VESSEL FOR SPECIFIED TIME

This contract is entered into as a result of negotiation pursuant to the authority of Title 10 U.S. Code 2304(a)(10); and any necessary determinations and findings, or other supporting statement of justification, prescribed by that Act or by the Defense Acquisition Regulation have been made.

The supplies and services to be obtained by this instrument are chargeable to the following allotments, the available balances of which are sufficient to cover the cost of the same:

AGENCY:	MILITARY SEALIFT COMMAND
APPROPRIATION AND SUBHEAD:	17X4912.3302
BUREAU CONTROL NO:	77777/-
AUTHORIZATION ACCOUNTING ACTIVITY:	62387
TYPE:	2E
COST CODE:	5202

THIS CHARTER PARTY, entered into this _____ day of _____, 19____, at Washington, D.C. by and between THE UNITED STATES OF AMERICA (hereinafter sometimes called the "Charterer" and sometimes called the "Government") represented by the Contracting Officer executing this document, and _____, a corporation organized and existing under the laws of the State of _____ (hereinafter sometimes called the "Owner" and sometimes called the "Contractor").

WITNESSETH THAT

The Owner agrees to let and the Charterer agrees to hire the United States flag SS/MV _____, on the following terms and conditions.

ARTICLE 1. DESCRIPTION OF VESSEL.

The Owner warrants that the vessel has the following characteristics:

- (a) Classed: _____ MARAD SS DESIGN TYPE _____
- (b) Call Sign: _____ Official No. _____
- (c) Year Built: _____
LOA: _____
Beam: _____
- (d) Engines: Of _____ Normal, _____ Brake, _____
Shaft, or Indicated H.P., as certified by classification society.

(e) Speed/Fuel Consumption:

(1) Warranted Speed: Capable of maintaining under normal conditions an average speed of about _____ knots in moderate weather when fully laden, on an average consumption of _____ barrels standard diesel or similar grade/standard grade "C" or equivalent oil fuel per 24 hours.

(2) Warranted Fuel Consumption: (when fully laden in moderate weather)

<u>Knots</u>	<u>Bbls. per mile</u>	<u>Bbls. per day</u>	<u>Operating Range</u>
15	_____	_____	_____
16	_____	_____	_____
17	_____	_____	_____
18	_____	_____	_____
19	_____	_____	_____
20	_____	_____	_____
21	_____	_____	_____
22	_____	_____	_____
23	_____	_____	_____

(f) Net Registered Tonnage:

(g) Deadweight: Deadweight capacity of vessel excluding bunkers, water and stores: _____ tons (2240 lbs) deadweight capacity of vessel including bunkers, water and stores: _____ tons (of 2240 lbs) on assigned summer mean draft of _____ feet _____ inches in salt water corresponding to a load line summer freeboard of _____ feet _____ inches under present international load line regulations. The vessel's load line is marked and so placed as to admit of her being safely loaded to such draft.

(h) Bale Cubic Capacity:

Clean/available gen'l. cargo spaces:

Number _____ Total bale capacity _____ cubic ft.

Clean/available reefer spaces:

Number _____ Total bale capacity _____ cubic ft.

Total combined bale capacity _____ cubic ft.

Number of tanks: _____ Total deep tank capacity _____ cubic ft.

(i) Amount and location of permanent ballast carried:

(j) Permanent bunker capacity, of about _____ barrels.

(k) Number of hatches and size of hatch openings; and number and location of 'tween decks:

(l) Number/location of winches, derricks, booms, and cranes with capacity of each:

(m) Navigational Equipment:

The Vessel is equipped upon commencement of the charter with the following navigational equipment and such equipment will be maintained in proper order at all times during the period of this charter.

- (1) Radar
- (2) Loran
- (3) Radio direction finder
- (4) Gyro compass
- (5) Automatic Steering Device

(n) Communications Capability:

The Vessel is or will upon delivery be equipped with the minimum communications capability as set forth in Annex A.

ARTICLE 2. PLACE AND DATE OF DELIVERY AND REDELIVERY, ETC.

- (a) Place of Delivery: _____
- (b) Date of Delivery: _____
- (c) Cancellation Date: _____
- (d) Place of Redelivery: _____
- (e) Charter Hire: \$ _____ per diem.
- (f) Fuel on board at time of delivery, as required by _____.

ARTICLE 3. SUBCHARTER.

Charterer may, without the prior written consent of the Owner, subcharter, or agree to subcharter, the Vessel under any form of charter to a party who is and will remain during the subcharter period a citizen of the United States within the meaning of Section 2 of the Shipping Act, 1916, and qualified to engage in the United States coastwise trade within the meaning of said Section 2. If Charterer shall enter into any such charter, Charterer shall nevertheless remain liable for the due performance of this Charter. Any such subcharter shall include a provision that it is subject to the provisions of this Charter.

ARTICLE 4. DELIVERY OF THE VESSEL.

(a) The Vessel shall be delivered to the Charterer at the place stated in paragraph (a) of Article 2 on or between the dates stated in paragraphs (b) and (c) of Article 2. The Vessel shall tender with all heavy lift equipment rigged and in operating condition. The heavy lift equipment shall be cradled unless otherwise required by the Charterer. The Owner shall absorb all expenses relating to the rigging and securing of all gear.

(b) The Vessel shall be placed at the disposal of the Charterer at the aforesaid port of delivery in such dock or at such wharf or place (where she may safely proceed to, lie at and depart from, always afloat, at all times of tide, except at such places where it is customary for similar size vessels to lie safely aground) as the Charterer may direct. Vessel on delivery shall be, insofar as due diligence may make her so, seaworthy, tight, staunch, strong, properly manned and in every way suitable and adequately fitted for, with all cargo gear approved by regulatory bodies, and in all respects ready to receive and transport lawful cargo; provided, that the Owner is not required to have the Vessel fitted with extra fittings or special gear required for a special trade or unusual cargo, unless Owner herein specifically assumes such obligation, but the Charterer shall have the use of any extra fittings or special gear aboard. (See Article 33(a)) The Owner upon tendering warrants that the vessel meets all current safety and health regulations of the appropriate regulatory authorities.

(c) Vessel will be equipped with a full set of cargo battens and clips at Owner's time and expense.

(d) Upon delivery the Charterer may require a joint on-hire survey of the Vessel.

(e) When the Vessel has arrived at the port of delivery in accordance with paragraph (a) of this Article and is in the berth designated by Charterer, and in the condition described in paragraph (b) of this Article, the Owner shall tender a notice of readiness by letter or telegram to the Contracting Officer or his representative at the port of delivery on a working day (Saturdays, Sundays, and holidays shall not be considered as working days). If proper notice of readiness is received by the Contracting Officer or his representative between 0800 and 1200, acceptance will be made within 4 hours after receipt of such notice. If proper notice of readiness is received between 1201 and 1700, the Charterer shall not be required to accept the Vessel until 0800 of the next working day. If, however, the Contracting Officer elects to receive the notice on Saturday, Sunday,

or a holiday, or after 1700 on a working day, the Vessel shall be accepted before noon of the next working day, unless the Contracting Officer or his representative at the port shall elect to accept earlier delivery. If the Vessel has arrived at the port of delivery in accordance with paragraph (a) of this Article, and is in the condition described in paragraph (b) of this Article, and is not in the designated berth because such berth is not available, notice of readiness may be tendered in accordance with this paragraph in the same manner as if the Vessel were in the designated berth, and acceptance shall be made in accordance with the provisions of this paragraph.

(f) If the Vessel should arrive at the place of delivery stated in paragraph (a) of Article 2, prior to the first date stated in paragraph (b) of Article 2, and is in the condition described in paragraph (b) of this Article, the Contracting Officer or his representative may, at his election, receive the notice of readiness and may thereafter accept delivery of the Vessel at any time prior to the first date stated in paragraph (b) of Article 2. However, if the notice of readiness is received prior to the first date stated in paragraph (b) of Article 2, as hereinbefore described in this paragraph, and the Contracting Officer, or his representative does not elect to accept delivery of the Vessel prior to the first date stated in paragraph (b) of Article 2, the Vessel will be accepted before noon of the first date stated in paragraph (b) of Article 2, without further tender of notice of readiness provided the Vessel is at such time in the condition described in paragraph (b) of this Article.

(g) Should the written notice of readiness not be tendered in accordance with the provisions of this Article prior to 1600 of the date stated in paragraph (c) of Article 2, Charterer shall have the privilege of cancelling this Charter at any time not later than the day of the Vessel's tender of readiness. In the event the Charterer does not exercise its privilege to cancel as provided by this paragraph and subsequent to the cancellation date the Charterer accepts delivery of the Vessel, such acceptance shall not be deemed to be a waiver of any rights the Charterer may have for damages suffered as a result of the Vessel not being delivered to the Charterer by the latest date specified in Article 2(c).

ARTICLE 5. PERIOD OF THE CHARTER.

(a) This Charter shall be for a period of from about _____ months/years to about _____ months/years from the time of delivery of the Vessel or to the termination of the voyage then current, Charterer's option.

(b) Options: Optional periods unless otherwise agreed shall be in direct continuation.

ARTICLE 6. INSURANCE AND INDEMNITY.

(a) During the period commencing with the acceptance and terminating with the redelivery of the Vessel, the Owner shall secure the customary full form marine insurance coverage on this Vessel including Hull & Machinery, P & I, War Risk Hull and Machinery including P & I, and Second Seaman's War Risk Policy. Except as provided in paragraphs (b) and (c) below, the expense for such insurance coverage shall be for the Owner's account and shall be deemed to be included in the charter hire paid under this Contract.

(b) Trading limits of this Vessel shall be worldwide, but Charterer agrees to notify the Owner as soon as practicable, if the Vessel is sent beyond the limits of American Institute Trade Warranties and to reimburse the Owner for the actual extra cost of marine insurance carried by the Owner on the date of this Charter Party that is occasioned by the Vessel's trading beyond such limits.

(c) With respect to the period commencing with the acceptance and terminating with the redelivery of the Vessel, the Charterer shall reimburse the Owner for any increase actually incurred in premiums or charges over those payable as of the date of this Charter Party for the cost of the following insurance coverages which are required by Article 6(a):

(1) War risk insurance on hull and machinery based upon the aggregate valuation of the Vessel stated in the marine risk insurance policy, policies or binders carried by the Owner on the date of this Charter Party, or if no marine insurance was carried on that date such valuation as shall be agreed upon by the Owner and the Contracting Officer.

(2) War risk insurance on the lives of or for injuries to officers and crew and loss or damage to their personal effects, including sextants of deck officers, in the form of Second Seaman's War Risk Policy.

(3) War risk insurance on leased equipment on board for which the Owner is responsible, on slop chests, on the actual value of the Vessel's unused consumable stores, bunker fuel and on cash carried on board not in excess of \$5,000 unless otherwise agreed.

(4) War risk protection and indemnity insurance for the benefit of the Owner and Charterer as their interests may appear, including Owner's liabilities to officers and crew until repatriated, in an amount not in excess of 50 percent more than the aggregate valuation of the Vessel stated in the marine risk insurance policy, policies or binders carried by the Owner on the date of this Charter Party.

(d) The Owner shall not be reimbursed by the Charterer for excess premiums paid by the Owner for obtaining a waiver of the 48-hour termination provision of war risk insurance and the granting of an extension in lieu thereof in the event of the outbreak of war.

(e) Notwithstanding Article 6(a) above, the Owner may elect to be a self-insurer, in whole or in part (including deductible provisions in any insurance policy actually carried) and the charter hire paid under this Charter shall be deemed to include a sum equivalent to a fair commercial premium for the insurance coverage required by Article 6(a).

(f) In the event all or any part of the insurance required by Article 6(a) which has been placed by the Owner, shall become vitiated, suspended, lapsed, or terminated from any cause arising out of or as a result of orders, acts or omissions of the Charterer or any persons acting for the Charterer, the Charterer shall indemnify the Owner against any loss, damage or expense suffered or sustained by it as a result of such vitiation, suspension, lapse, or termination; provided, however, that the Owner shall credit the Charterer with any savings in respect of such premiums from the time of such vitiation, suspension, lapse, or termination. The value of the Vessel shall be determined as set forth in Article 6(c)(1).

(g) The Charterer shall indemnify and hold harmless the Owner, the Master and the Vessel from the losses, expenses and liabilities proximately caused by compliance with any orders or directions of the Charterer, its agents, representatives or employees except those properly chargeable to the Owner under other provisions of this Contract or which are recoverable under any insurance carried by the Owner or would have been recoverable under insurance required by Article 6(a) if the Owner had not elected to be a self-insurer in whole or part. The Owner shall, as far as may be practicable, keep the Charterer, through the Contracting Officer, currently informed in writing as to any oral orders (involving substantial delays, expense or risk to the Vessel or her cargo) which have not been promptly confirmed in writing by the person giving such orders. The Charterer's total liability shall not exceed 150 percent of the fair market value of the Vessel at the time of the loss less whatever amounts are recovered from the underwriters or other parties. The fair market value shall be determined by the Contracting Officer, but if the Owner does not agree with the amount determined by the Contracting Officer to be the fair market value, such disagreement shall be deemed to be a dispute as to a question of fact within the meaning of the clause entitled "Disputes".

(h) In the event all or any part of the war risk insurance described herein, expires whether by reason of the automatic termination clause of the policies or otherwise, and the Owner is unable to obtain comparable coverage either from the Government or commercial underwriters; the Charterer agrees to indemnify the Owner against any loss, damage or expense incurred by the Owner or the Vessel which, but for the expiration of such insurance, would have been covered thereby; provided, however, that the Owner shall credit the Charterer with any savings in respect of such premiums from the time of such expiration.

(i) In the event of loss or damage to the Vessel caused by ice which would be recovered under the terms of a full form marine hull insurance policy, but which is excluded from such policy by the provisions of the American Institute Trade Warranties, such loss or damage shall be made good by the Charterer but only to the extent not covered by insurance.

(j) Except as otherwise specifically provided in this Charter Party the Charterer shall not be liable for any loss, damage, expense, cost or liability whatsoever and nowsoever incurred by the Owner or Vessel which is recoverable under any insurance carried by the Owner or would have been recoverable under insurance required by Article 6(a) if the Owner had not elected to be a self-insurer in whole or in part.

ARTICLE 7. CARGO.

(a) The Vessel shall be used in transporting any lawful cargo excluding the carriage of livestock, but Charterer shall have the privilege of shipping a small number of livestock on deck at Charterer's risk. All necessary fittings and other requirements for the carriage of livestock on deck shall be for Charterer's account.

(b) Cargo may include gasoline and diesel engine vehicles all preloaded with cargo and with batteries connected and fuel tanks 3/4 filled.

(c) The Charterer (except as to matters affecting only the stability and seaworthiness of the Vessel) shall be exclusively responsible for proper loading, stowage, and discharge of goods of an inflammable, explosive or dangerous nature, and shall comply with all applicable regulations and furnish any necessary fittings.

(d) The Charterer will obtain all necessary Coast Guard waivers and permits.

ARTICLE 8. LOADING AND DISCHARGING.

(a) The cargo or cargoes shall be laden and discharged at any dock or any wharf, place or open roadstead that Charterer may direct, provided the Vessel can lie always safely afloat at any time of tide except at such places where it is customary for similar size vessels to lie safely aground. If the Charterer directs the Vessel to any berth which the Charterer knows or should know is unsafe and the Vessel is damaged as a direct result thereof and through no fault of the Owner, Master, crew or pilot or error of navigation, the repairs shall be for the Charterer's account.

(b) The Charterer shall pay all expenses directly connected with the loading and discharging of the cargo including stevedoring, wharfage, clerking and tallying, winchmen, heavy lifts, dunnage, stowing, securing and trimming, and removal of strongbacks with shore equipment where the use of shore equipment is not necessitated by a structural or mechanical defect in the Vessel unless that defect is caused by the fault or negligence of the Charterer. Unless otherwise provided herein the Charterer shall provide necessary dunnage and shifting boards, also any extra fittings or materials requisite for a special trade or unusual cargoes, but the Owner shall allow the Charterer the use of any dunnage, shifting boards and other fittings or materials already on board the Vessel. The Charterer shall have the privilege of using shifting boards for dunnage, but if the Vessel's shifting boards are used as dunnage, the Charterer shall make good any damage to or shortage of such shifting boards on redelivery of the Vessel. If the Charterer elects or is requested by the Owner to remove dunnage and fittings placed on board by the Charterer, the cost of removal and discharge shall be borne by the Charterer.

(c) The Charterer shall have the use of the Vessel's winches and other appropriate gear actually on board, and the Owner shall provide sufficient power to operate all the Vessel's winches simultaneously. The Vessel shall work night and day, if required by the Charterer.

(d) Any damage to the Vessel or its equipment which occurs during loading or discharging operations caused by the negligence or failure of the equipment of the Charterer, its agents, employees or contractors in performing the Charterer's duties of loading and discharging the Vessel, or in preparation for such loading or discharging, shall be repaired at the Charterer's expense and the Owner agrees to assign to the Charterer any rights, causes of action, or other claims which the Owner may have against third persons, except Owner's underwriters, with respect to such damages.

(e) The Charterer shall not be liable for the repair of any damage under Article 8(a) or (d) or any other provisions of this Charter unless written notice specifying such damage, and, if obtainable, the name of the party or parties causing such damage, shall have been given to the Charterer or its authorized representative within a reasonable time (reasonable time for purposes of this paragraph shall be deemed to be within 24 hours (i) after the alleged damage occurs or (ii) is discovered, or (iii) could have been discovered by the exercise of due diligence by the Owner, Master, Officers or crew of the Vessel).

(f) Lighterage, if any, will be at the risk and expense of the Charterer.

(g) Cargo shall be loaded, stowed, trimmed, secured and discharged by the Charterer under the Master's supervision and the Master shall be responsible for such activity as it pertains to the seaworthiness of the Vessel. The Charterer shall not be liable for any losses caused by shifting cargo unless resulting from a latent defect in the cargo.

(h) In no case shall the cargo exceed what the Vessel can reasonably stow and carry, in the judgment of the Master, over and above the space and burthen necessary for Vessel's officers and crew, her cabin, tackle, apparel, furniture, provisions, fresh water, stores, necessary ballast and fuel. The amount of the deck cargo shall be at the discretion of the Master and the loading, carriage and discharge thereof shall be at the risk of the Charterer. Any material required for securing deck cargo is to be furnished by the Charterer and for its account, but Charterer may have the use of any deck lashings aboard the Vessel.

(i) If by reason of the Owner's failure to use due diligence as provided in Article 21(a) to keep the Vessel in a thoroughly efficient state of hull, machinery, equipment, personnel, and other particulars relating to the seaworthiness of the Vessel, the Charterer incurs cost of stevedoring detention or standby time in connection with the loading or discharging of cargo, such costs shall be for the account of the Owner; provided, however, the Owner shall not be liable for such costs unless the period of detention or standby exceeds 20 minutes. The Charterer, within 24 hours after the period of detention or standby commences, shall give the Owner or its representative written notice of the detention or standby time.

(j) The Charterer shall not be held responsible for losses sustained by the Owner or the ship through the negligence of pilots, or tugboats or any other error of navigation during docking or undocking.

ARTICLE 9. CLEANING.

(a) Upon delivery in accordance with Article 4, all holds and those deep tanks specified in Article 1(g) shall be cleaned and ready to receive lawful cargo.

(b) Any cleaning of the Vessel's holds or deep tanks during the period of the Charter shall be for the account of the party ordering the last previous use of such holds or deep tanks during the period of this Charter; provided, however, that where the ballast is carried in cargo deep tanks after use by the Charterer for fuel, such ballasting shall not be deemed the last use of such deep tanks for the purposes of this subsection.

(c) Upon redelivery of the Vessel in accordance with Article 30, the holds of the Vessel and those deep tanks the last use of which was made by the Charterer, shall be swept clean with refuse removed, unless during the period of this Charter the Vessel has carried in these spaces cargo with respect to which custom requires more complete cleaning, in which case the Charterer shall give such spaces the required cleaning.

ARTICLE 10. OVERTIME, PENALTY TIME AND OTHER ADDITIONAL EMOLUMENTS.

All overtime, penalty time, and other additional emoluments payable to the Vessel's crew for any reason whatsoever including those arising from compliance with any orders or directions of the Charterer, its agents, representatives, or employees shall be for the Owner's account except as provided in Article 14(b) and (d).

ARTICLE 11. ALTERATIONS.

The Charterer shall be at liberty to install any equipment or defensive armament (including demagnetization by installed equipment or other process, e.g., degaussing, wiping or deperming), to make alterations and additions incidental to the service in which the Vessel is to be used, and to install any additional gear or equipment for loading, carrying or discharging cargo beyond that on board at the beginning of this Charter. Such work shall be done at the Charterer's expense and on its time, and shall not be such as to affect the seaworthiness of the Vessel or the safety of the crew, or as to be in contravention of any applicable law of the United States or regulation made pursuant thereto. Such equipment, armament, materials, and gear so fitted are to be the Government's property; and the Charterer shall remove the same together with any such alterations and additions at its expense before redelivery, and shall restore the Vessel to her condition prior to such changes (ordinary wear and tear excepted).

ARTICLE 12. ECONOMIC PRICE ADJUSTMENT.

(a) The Contractor warrants that the charter hire rate does not include any contingency allowance to cover the possibility of increased cost of performance resulting from increases in (1) the manning scale and ratings constituting the Vessel's complement as set forth in Schedule A, by reference incorporated herein, or (2) to total wages payable to the Vessel's complement as set forth in Schedule A; or (3) the cost of subsistence as set forth in Schedule B, by reference incorporated herein; or (4) the cost of the Vessel's stores as set forth in Schedule B. The Charterer and Contractor agree that increases or decreases in cost of performance for all periods the Vessel is on-hire shall be subject to economic price adjustment upward or downward as set forth in (c) through (d) below. It is agreed that economic price adjustment shall not become effective until _____ and that the base date for calculation of economic price adjustment shall be _____, the Contractor paying for any increases in items covered by economic price adjustment prior to _____ no matter when such increases are actually incurred as a debt or paid. Schedules A and B referred to above shall be submitted by the Contractor showing costs on _____

(b) For the purpose of this clause (i) the term "total wages" includes but is not limited to basic wages, pension and welfare costs, vacation pay, and any other fringe benefits or other payments paid as a result of collective bargaining agreements and overtime at the agreed percentage of _____ of base wages vice actual overtime for each department of the Vessel and related taxes, all as set forth in Schedule A; provided, however, that if a revision of any such agreement makes an adjustment in overtime hours as a result of a change of the work week or in fringe benefits and by reason thereof, the Contractor pays total wages in excess of or less than those set forth in Schedule A, "total wages" shall include all overtime actually incurred solely by reason of such adjustment and further provided that nothing herein shall obligate the Government to pay any increase in actual overtime unless such increase is a result of a change in collective bargaining agreements as herein provided; (ii) the term "stores" means the stores of the Deck, Engine, or Steward's Department of the Vessel; (iii) the term "subsistence" means the provisions used in subsisting the crew members.

(c) In the event that after _____ the price for stores and subsistence shall be in excess of or less than the prices shown in Schedule B, for the period commencing upon the effective date, payment will be made by the Charterer or credits by the Contractor for adjustments upward or downward during that period, in accordance with the procedures set forth in Schedule B.

(d) In the event that after _____, the Contractor, as a result of collective bargaining agreements, shall be required to pay total wages to the Vessel's complement in excess or less than those shown in Schedule A for the period commencing upon the effective date, payment will be made by the Charterer or credits by the Contractor for adjustments upward or downward during that period, not less frequently than every three months.

(e) At twelve month intervals from the effective date of economic price adjustment the Charterer and Contractor may agree on a lump sum adjustment to include any payments or credits known to be due at that date under this Article 12.

(f) Failure of the parties to agree upon an adjustment as provided in this clause shall be deemed to be a dispute as to a question of fact within the meaning of the clause entitled "Disputes."

ARTICLE 13. CARGO RECEIPT.

(a) The Charterer shall prepare a manifest which shall list the cargo loaded on the Vessel. The Master shall sign this manifest in acknowledgement of the receipt of cargo said to have been loaded by the Charterer without responsibility as to quantities, mixture, mark, number of packages, weights, etc., or the apparent condition of the cargo, it being understood that it is the Charterer's responsibility to tally the cargo and to check the condition thereof upon loading and discharging.

(b) Any receipt signed by or on behalf of the Master or Agent shall be without prejudice to the terms, and conditions and exceptions of this Charter and subject to all of them. The Charterer hereby agrees to indemnify and hold harmless the Owner, the Master, and the Vessel of and from all consequences or liabilities that may arise from any irregularity in the papers supplied by the Charterer or its agents, or from any inconsistency of such papers, including bills of lading, with this Charter.

(c) In the case of any loss or damage to or in connection with goods exceeding in actual value \$500 lawful money of the United States, per package, or in the case of goods not shipped in packages, per measurement ton, the value of the goods shall be deemed to be \$500 per package or per measurement ton, and the Owner's liability, if any, shall be determined on the basis of the value of \$500 per package or per measurement ton, unless the nature of the goods and a valuation higher than \$500 shall have been declared in writing by the Charterer upon loading and in such case, if the actual value of the goods per package or per measurement ton shall exceed such declared value, the value shall nevertheless be deemed to be the declared value.

(d) The terms of the Contract shall apply to any shipment made by the Government whether or not bills of lading are issued.

ARTICLE 14. CHARTER HIRE.

(a) Except as otherwise provided herein, the Charterer shall pay for the use and hire of the Vessel at the rate stated in paragraph (e) of Article 2, per 24-hour day or pro rata part thereof from the time of her delivery and acceptance by the Charterer in accordance with Article 4 to the time of her redelivery in accordance with Article 30. However, hire shall cease at noon of the day the Vessel is lost or becomes a constructive total loss. In the event of damage, the Vessel shall be a constructive total loss under this Charter when the expense of recovering and repairing the Vessel shall exceed its repaired value regardless of the insured value of the Vessel. The determination as to whether or not the Vessel is a constructive total loss shall be made by the Contracting Officer as soon as practicable upon receipt of notification that the Vessel has suffered substantial damage. If the Vessel is missing hire shall cease at noon of the last day the Vessel was heard from. Charter hire under this subparagraph shall be based on elapsed time measured by Greenwich MEAN time.

(b) If, because of the carriage of "penalty cargoes" or explosives as defined in prevailing wage agreements, the Owner is required to pay additional wages to the crew, the Charterer shall reimburse the Owner the amount of such additional wages provided such additional wages do not exceed the amounts set out in applicable agreements with recognized labor unions.

(c) The Charterer shall reimburse the Owner for crew return transportation expenses, other than those which are reimbursable to the Owner under its insurance policies, where such transportation expenses are incurred by the Owner during the currency of the Charter in accordance with applicable labor agreements unless such repatriation was the result of the willful fault of the Owner, Master, or crew.

(d) The Charterer shall reimburse the Owner for its actual out-of-pocket expenses including all taxes with respect thereto for which the Owner is responsible by reason of applicable collective bargaining agreements or by compliance with orders of any duly authorized agency of the Government for (i) any war risk

bonuses, extra wages based on the areas to be traversed during, or the ports of call of, any voyage hereunder; (ii) any required payments to the officers or crew of the Vessel necessarily incurred by reason of orders or direction of the Government which require the Owner to breach existing Articles of the crew or contracts with the Officers, provided such Articles comply with the instructions of the Charterer; (iii) all wages, overtime, subsistence, bonus of extra officers and men beyond the normal complement of the Vessel as of the date of the Charter Party, who are employed, because of the special requirements of the Vessel's service under this Contract, including all personnel necessary to provide for persons carried at the request of the Charterer; (iv) all wages and overtime paid to security watchmen provided in compliance with any written security requirements of the Charterer or port authority, and all overtime or additional wages paid to the officers or crew standing watch by reason of compliance with such requirements; (v) all wages and bonuses payable in case of loss of the Vessel, including constructive total loss, though the date of loss is unknown but only to the extent not covered by insurance.

(e) The Contractor agrees that any insurance payments, refunds, rebates, credits or other amounts (including any interest thereon) accruing to or received by the Contractor under this Contract shall be paid by the Contractor to the Government to the extent that they are properly allocable to costs, expenses or reimbursements for which the Contractor has been reimbursed by the Government under the terms of this Contract.

ARTICLE 15. METHOD OF PAYMENT AND ACCOUNTING INFORMATION.

Payment of hire as earned, port charges, canal tolls, if any, and any other charges for Charterer's account as provided herein, shall be made upon submission of properly certified invoices or vouchers in accordance with applicable billing instructions. Invoices or vouchers may be submitted by the Owner every fifteen days to Military Sealift Command, Department of the Navy, Washington, D.C. 20390, Attention Code: M-56.

ARTICLE 16. PORT CHARGES AND EXPENSES.

(a) Except as otherwise provided herein Charterer shall pay all dues, taxes and similar port charges imposed by public authority including consular charges (except those pertaining to the Master, Officers and crew), incurred by the Vessel in ports visited pursuant to Charterer's direction. The Charterer shall also pay all expenses incurred by the Vessel in the aforesaid ports which, although not imposed in the instant case by public authority, are usually imposed by public authority, such as wharfage or dockage. The Charterer further agrees to pay all expenses necessarily incurred by the Vessel entering or leaving the aforesaid ports (including agent's and custom broker's fees). The Charterer shall also pay for (i) pilotage of the Vessel where such pilotage is customary, or where the Vessel is required by the Government to enter or transit a hazardous or restricted area or body of water; and (ii) pilotage or towage in connection with the bunkering or ballasting of the Vessel, or in shifting the Vessel in accordance with the orders of the Government. Nothing herein shall be construed as requiring the Charterer to pay expenses incurred by the Owner of the Vessel for services rendered for the convenience of the Owner, the Vessel or its Master, Officers or crew or in connection with the Owner's business such as fees of underwriters, or expenses in moving the Vessel about the port to obtain stores or provisions or in connection with the maintenance of the Vessel. All of the charges and expenses which are incurred for Charterer's account as aforesaid will be paid by the Owner, who shall be reimbursed by the Charterer upon presentation of properly certified vouchers and supporting receipts.

(b) All fees of agents appointed by and used by the Owner to husband the Vessel, including the fees of agents appointed for canal transits and at bunkering ports, shall be for the account of the Charterer at ports at which the Vessel touches, pursuant to the instructions of the Charterer; provided that such fees shall not exceed those customarily charged commercial vessels for similar services. The Charterer shall reimburse the Owner for postage and petty expenses incurred by the Owner in foreign ports, Canal Zone and Guam, up to a maximum amount of \$20.00 per port.

ARTICLE 17. FUMIGATION.

If fumigation is ordered because of cargoes or passengers carried for Charterer's account, or because of ports, wharves or docks visited pursuant to Charterer's instructions, the time so lost as a result of the fumigation and the cost incurred thereby shall be for Charterer's account. If the fumigation is ordered for any other reason, the time lost thereby and the expenses incident thereto shall be for Owner's account.

ARTICLE 18. FUEL.

(a) Upon delivery of the Vessel the Owner shall present to the Contracting Officer a statement certified by the Owner or his authorized agent showing the amount and grade of fuel on board at the time of delivery with such additional verification as the Contracting Officer may require and the Charterer shall pay the Owner for such fuel based upon cost of fuel at the last refueling point. The Owner shall provide additional bunkers as may be required by the Charterer prior to the acceptance of the Vessel by the Charterer and the Charterer shall reimburse the Owner all costs directly connected with the bunkering of the additional fuel, including but not limited to lighterage, dockage and similar charges, and related taxes thereto, except crew overtime, penalty time and other additional emoluments.

(b) The Charterer shall reimburse the Owner the cost of all fuel procured by the Owner and loaded in the Vessel during the period of this Charter. However, the Owner shall not be reimbursed any amount in excess of the lowest current market price of such fuel at the place of loading plus all reasonable expenses incurred by the Owner in loading said fuel on board the Vessel. If during any three (3) month period the vessel consumes in excess of 105% of the fuel consumption rate warranted at any of the speeds listed in Article 1.e.(2), such excess will be for the account of the Owner. The title to all fuel for the cost of which the Owner is entitled to be reimbursed hereunder shall automatically pass to and vest in the Charterer upon delivery to the Owner or upon the happening of any other event by which title passes from the vendor or supplier thereof to the Owner, in the case of any such fuel which is purchased for the performance of this Charter. The Charterer shall be afforded all benefits of Owner's contracts for its fuel requirements.

(c) The Charterer may supply or cause to be supplied any or all of the fuel required by the Vessel during the period of the Charter. The grade of such fuel is to be as specified in Article 1(d). If the Owner loads such fuel on the Vessel at his own expense, the Charterer shall reimburse the Owner's reasonable costs of such loading.

(d) If the Vessel should go off-hire during the period of this Charter, the Owner shall present to the Contracting Officer a statement certified by him or his authorized agent showing the amount of fuel on board at the time the off-hire period commenced and the amount of fuel on board when the off-hire period ended. The Charterer shall be credited for the cost of the fuel consumed during the off-hire period and also reasonable expenses incurred in loading such fuel, such costs to be based upon costs at the last refueling point.

(e) Upon redelivery of the Vessel the Owner shall present to the Contracting Officer a statement certified by the Owner or his authorized agent showing the amount of fuel on board at the time of redelivery with such additional verification as the Contracting Officer may require and the Charterer shall be credited for such fuel based on the cost of fuel at the last refueling point.

(f) The term "current market price" as used in this Article, shall mean a price not in excess of the Contractor's own bunker contract price, or the supplier's posted or established selling price for the date of the particular loading, whichever is less, and such taxes necessarily incurred on the fuel or lubricating oil which the Contractor is required to pay.

(g) The term "reasonable expenses", as used in this Article, shall mean all reasonable costs, except crew overtime, penalty time or other additional emoluments, which were necessarily incurred in loading fuel on board the Vessel, such as expenses incurred at tanker terminal, loading fuel from lighters, barges, or other craft used as lighters, including lighterage, lighter demurrage or detention incurred, cost of shifting lighters for the convenience of the Vessel, handling lighter lines, and such similar expenses which the Contracting Officer shall find were necessarily incurred in the loading of fuel on the Vessel during the period of this Charter.

(h) The Charterer agrees to reimburse the Owner for all expenses incurred by him under paragraphs (b) and (c) of this Article upon certification to and verification by the Contracting Officer of the original receipted invoices covering such charges or other documents as the Contracting Officer may require.

ARTICLE 19. OFF-HIRE.

(a) In the event of loss of time from deficiency of men including but not limited to misconduct, illness, strikes and lockouts; or deficiency of stores, breakdown of machinery or equipment; collision; stranding; fire; detention by authorities; average accidents to ship or cargo; repairs; inspections or by any other cause whatsoever not due to the fault of the Charterer; preventing the full working of the Vessel, the payment of hire, overtime and escalation shall cease for all the time thereby lost until the Vessel is fully available for Charterer's service; provided, however, when the period of time lost to the Charterer on any one occasion is less than twenty-four (24) consecutive hours, hire shall not be reduced for such period unless it exceeds twelve (12) hours, in which case such period shall be counted as one day.

(b) All port charges, pilotages, and other expenses incurred during any period the Vessel is off-hire, and consequent upon the putting into any port or place other than to which the Vessel is bound, shall be borne by the Owner.

(c) If upon any passage the Vessel fails to make the speed warranted in Article 1(d), or her fuel consumption exceeds that warranted in Article 1(d) due to a defect in or breakdown of any part of her hull, machinery, or equipment, casualty, or inefficiency of Master, Officers, or crew, or their failure to proceed with utmost dispatch, the Vessel is delayed more than twelve hours; the hire for the time lost and cost of extra fuel consumed, if any, shall be borne by the Owner. Any delay by ice or time spent in quarantine shall be for Charterer's account, except delay in quarantine resulting from the Master, Officers or crew having communications with the shore at an infected port, where the Charterer has given the Master adequate notice of the infection; which shall be for Owner's account.

(d) At all U.S. ports, including territories and possessions, the Vessel shall also be off-hire for all time lost because cargo cannot be loaded or discharged by reason of a strike, lock-out of any class of workmen essential to the loading or discharging of cargo, disputes between Master and men, jurisdictional dispute between unions, or any other cause due to labor dissension beyond the control of the Charterer, or if the Vessel is unable to enter or leave a berth due to a strike, or disputes between Master and men, jurisdictional dispute between unions, or any other cause due to labor dissension beyond the control of the Charterer.

(e) In the event of detention of the Vessel by authorities at home or abroad in consequence of legal action against the Vessel or Owner whereby the Vessel is rendered unavailable for Charterer's service for a period of 10 days, unless brought about by the act or neglect of the Charterer, the Charterer, by written notice, shall have an option to cancel this Charter or to suspend same until the service can again be resumed, without prejudice to any right of claim for damage which the Charterer may have. Payment of hire to cease during time the Vessel may be out of Charterer's service by the cause mentioned in the clause, unless the time out is less than 12 hours, in which event there is to be no interruption in hire payments.

(f) If the loss of time resulting from any strikes or lockouts exceeds 12 days, the Charterer shall have an option to cancel this Charter or to suspend same until the service can again be resumed, without prejudice to any right of claim for damage which the Charterer may have.

ARTICLE 20. TIME LOST.

Any time lost by the Vessel during this Charter Party (including all options, if exercised) due to breakdown of machinery, interference by authority, collision, stranding, fire or other accidents or damage to the Vessel, or repairs, inspections, overhaul and alterations, preventing the full working of the Vessel shall be added to the charter period (including all options, if exercised) at Charterer's option, declarable at least 30 days prior to the expiration of the Charter. The

applicable hire rate shall be that in effect when the time was lost. If total time lost involves more than one hire rate, the hire rate for the time lost period shall be computed on the basis of a weighted average of all rates involved. The foregoing applicable hire rate provision for lost time shall not affect the application of Article 12 (Economic Price Adjustment). If the time lost option is exercised, economic price adjustment payments during that optional period shall be made at the economic price adjustment rate applicable during the optional period and not at the applicable rate in effect when the time was lost.

ARTICLE 21. OWNER'S OBLIGATION.

(a) Except as otherwise specifically provided in this Charter, the Owner shall during the period of the Charter pay for the wages and consular shipping and discharging fees of the crew, the insurance of the Vessel, and he shall provide and pay for all provisions of the crew, necessary stores, including boiler water and ballast, but the aforesaid provisions and stores carried during the period of the Charter at no time shall exceed one and one-half percent of the deadweight capacity of the Vessel, allowing a maximum of 250 tons, without prior approval of the Charterer, or unless under existing circumstances the seaworthiness of the Vessel requires a larger amount. The Owner shall use due diligence to maintain the aforesaid class of the Vessel, and to keep the Vessel in a thoroughly efficient state in hull, machinery, equipment, personnel, and other particulars relating to the seaworthiness of the Vessel. The Owner shall pay for all expenses incurred in the navigation and management of the Vessel, except as otherwise specifically provided herein.

(b) Owner as Agent: Notwithstanding the provisions of Article 16(b) the Contractor agrees to act as an agent of the Government from time to time to arrange for stevedoring services for discharge of the above named vessel at ports designated by the Government. The Government shall reimburse the Contractor for all cargo handling and related costs following submission of properly certified invoices supported in accordance with applicable billing instructions. In the event that paid receipts are not available, a copy of the cancelled check or bank wire transfer may be submitted in lieu of the receipt. Reimbursement shall be limited to expenditures actually made by the Contractor, its agents or sub-agents for such cargo handling and related expenses.

The Government shall notify the Contractor of a requirement for agent services as soon as possible prior to the vessel's arrival at the designated port or ports. Said notice shall be verified in writing, or by telex and shall specify the port, arrival date, and description of cargo to be handled (specifying all explosives or hazardous cargo) and such other information as necessary or appropriate for Contractor to arrange for requested services.

(c) The Owner shall provide fuel used by the Vessel during the period of this Charter in accordance with the provisions of Article 18.

(d) The whole reach of the Vessel's holds, decks, and usual places of loading, including the deep tanks specified in Article 1(g) shall be at the Charterer's disposal, reserving only proper and sufficient space for ship's Master, Officers and crew, tackle, apparel, furniture, provisions, stores and fuel.

(e) The Owner, through his agents, employees and servants shall commence and prosecute the voyages made pursuant to the Charter with utmost dispatch and shall render all customary assistance with the ship's crew and boats.

(f) The Owner shall have maintained on board the Vessel complete deck and engine room logs. The Owner shall make the rough and smooth logs of the Vessel available to the Charterer and shall upon request of the Charterer furnish the Charterer with true copies of the rough or smooth logs of the Vessel. The Owner shall also furnish to the Charterer upon request an abstract of the daily entries in such log showing cargo given the cargo, courses steered, distances run on each course, noon position, distance made good each day from noon to noon, consumption of fuel, and remainder of fuel in the bunkers at the end of each day. Such abstract shall also contain appropriate meteorological data including the condition of the sea and a report of any marine casualty which results in damage to the cargo or in delay of the Vessel.

(g) The Charterer shall have the privilege of carrying passengers, of assigning officers and/or enlisted men aboard the Vessel for duty purposes and shall have permission to appoint a supercargo as far as accommodations and United States Coast Guard certification allow Charterer paying an amount of \$8.00 per day, per person, covering all expenses including accommodations, victualling, any steward's department extra remuneration and overtime, penalty time, accompanying fringe benefits, and taxes incurred, in accordance with the terms of Owner's labor agreements, incurred as a result of carrying such persons. Owner shall victual pilots and Customs officers, and also, when authorized by Charterer, shall victual tally clerks, stevedore's foremen, etc. Charterer shall pay \$2.00 per meal for all such victualling.

(h) In addition to the carriage of personnel noted in (f) above, Charterer shall have the right to assign other military personnel aboard the Vessel. Such personnel not to require victualling, berthing, or sanitary facilities from the ship unless requested by the military commander aboard, in which case the Owner will be reimbursed out-of-pocket expenses not to exceed the amount per person per day set forth in (f) above. Charterer will supply life floats and jackets for the use of such military personnel carried aboard the ship during the charter period. Such items to be removed by Charterer at termination of Charter.

(i) The Charterer shall be liable to the Owner for any loss of the Vessel's fittings or appurtenances or any damage to the Vessel, her fittings, or appurtenances caused by the act of passengers, supercargoes, evacuees or military personnel in the embarkation, carriage or debarkation of passengers, supercargoes, evacuees or military personnel to the extent such loss or damage is not payable under the Vessel's insurance policies; provided the Charterer shall not be liable for such damage unless written notice specifying such damage, and if obtainable, the name of the party or parties causing such damage shall have been given to the Charterer or its authorized representative within a reasonable time.

(j) The Vessel shall be equipped and rigged with tent gantlines and blocks prior to arrival at ports where, because of climatic conditions, the use of hatch tents is customary.

(k) The Vessel shall provide sufficient cargo lights to equip working hatches with four portable lights, plus sufficient number of replacements in event of damage.

ARTICLE 22. THE MASTER, OFFICERS AND CREW.

(a) The Master, Officers and crew of this Vessel shall be appointed or hired by the Owner and shall be deemed to be the servants and agents of the Owner at all times except as otherwise specified in this Charter. The Master of Vessel, shall be under the direction of the Charterer as regards the employment of the Vessel, but shall not be under Charterer's orders as regards navigation, care and custody of the Vessel and care of the cargo. The Master, Officers, and crew, in supervising the loading, stowage, trimming, securing, or discharging of cargo shall be deemed the agents of the Charterer except insofar as such supervision pertains to the seaworthiness of the Vessel.

(b) The Master, Officers and crew shall use due diligence in caring for and ventilating the cargo.

(c) The Charterer shall furnish the Master with all requisite instructions and sailing directions, in writing. Should the Charterer elect to change these instructions or sailing directions after the Master has acted upon them in a reasonable and prudent manner, and the Owner incurs extraordinary expenses thereby, the Charterer shall reimburse the Owner for such expenses as were the direct result of change in such instructions or sailing directions.

(d) If the Charterer shall have reason to be dissatisfied with the conduct of the Master, Officers or crew, the Owner shall, on receiving particulars of the complaint, investigate it, and if necessary make a change in personnel.

(e) In the event shore liberty is not permitted, the Master of the ship will be advised promptly in writing of this restriction by the shore commander.

ARTICLE 23. STATUTORY EXEMPTIONS.

(a) This Contract is subject to all the terms and provisions of and all the exemptions from liability for damage to cargo from the time the cargo is loaded until the time it is discharged from the Vessel contained in Subsections (1), (2) and (3) of Section (4) of the Carriage of Goods by Sea Act of the United States, approved April 16, 1936. For the purposes of this Contract, the term "Carrier" as used in said Act shall mean the "Owner" and the term "Shipper" shall mean the "Charterer".

(b) Any provision of this Charter to the contrary notwithstanding, the Owner and the Vessel shall have the benefit of all limitations of and exemptions from liability for damage to cargo accorded to the Owner or demise charterer of vessels by any statute or rule of law for the time being in force.

(c) Neither the Owner nor any corporation owned by, subsidiary to, or associated or affiliated with the Owner shall be liable to answer for or make good any loss or damage to the cargo occurring at any time and even though before loading on or after discharge from the Vessel, by reason or by means of any fire whatsoever, unless such fire shall be caused by its design or neglect.

ARTICLE 24. EXCEPTIONS.

The act of God, enemies, fire, restraint of princes, rulers of people, and all dangers and accidents of the seas, rivers, machinery, boilers and steam navigation and errors of navigation throughout this Charter Party always mutually excepted. The Vessel shall have the liberty to sail with or without pilots, to tow and to be towed, to assist vessels in distress, and to deviate for the purpose of saving life or property, or to go into dry dock or into ways with or without cargo on board.

ARTICLE 25. LIBERTIES.

The Owner, Master and Vessel shall have liberty to comply with any orders or directions as to loading, departure, arrival, routes, ports of call, stoppages, discharge, destination, delivery or otherwise howsoever given by the Government of any nation or department thereof or any person acting or purporting to act with the authority of such Government or of any department thereof, or by any committee or person having, under the terms of the war risk insurance on the Vessel, the right to give such orders or directions, and if by reason of or in compliance with any such orders or directions anything is done or is not done, such shall not be deemed a deviation or breach of orders or neglect of duty by the Master or the Vessel. Delivery or other disposition of the goods in accordance with such orders or directions shall be a fulfillment of the contract voyage. The Vessel may carry contraband, explosives, munitions, warlike stores, hazardous cargo, and may sail armed or unarmed and with or without convoy.

ARTICLE 26. AMENDED JASON CLAUSE.

In the event of accident, danger, damage, or disaster, before or after commencement of the voyage resulting from any cause whatsoever, whether due to negligence or not, for which, or for the consequence of which, the Owner is not responsible, by statute, contract, or otherwise, the cargo, shippers, consignees, or owners of the cargo shall contribute with the Owner in general average to the payment of any sacrifices, losses, or expense of a general average nature that may be made or incurred, and shall pay salvage and special charges incurred in respect of the cargo. If a salving vessel is owned or operated by the Owner, salvage shall be paid as fully as if such salving vessel or vessels belonged to strangers.

ARTICLE 27. GENERAL AVERAGE CLAUSE.

General average shall be adjusted, stated and settled, according to York-Antwerp Rules 1974, at such port or place in the United States as may be selected by the Owner, and as to matters not provided for by those Rules, according to the laws and usages at the port of New York. In such adjustment, disbursements in foreign currencies shall be exchanged into United States money at the rate prevailing on the dates made and allowances for damage to cargo claimed in foreign currency shall be converted at the rate prevailing on the last day of discharge at the port or place of final discharge of such damaged cargo from the ship.

ARTICLE 28. SALVAGE.

All salvage moneys earned by the Vessel during the period of this Charter shall be divided equally between the Owner and the Charterer after deducting Master's, Officers' and crew's shares, legal expense, hire of the Vessel during the time lost as a result of the salvage service, value of fuel consumed, repairs of damage, if any, and other extraordinary loss or expense sustained as a result of the salvage service.

ARTICLE 29. DETENTION.

(a) Except to the extent that loss of time is caused by the fault, negligence or failure of the Owner, Master, Officers or crew, to exercise due diligence to keep the Vessel working and to prevent loss of time, payment of hire shall not be reduced because of:

(1) The happening of any event listed in Article 19(a) of this Charter caused by the fault of the Charterer or caused or contributed to by war or warlike acts, sailing in convoy, operating (contrary to peacetime custom) without lights or pilots, navigating or mooring in (contrary to peacetime custom) unlighted; unbuoyed, or overcrowded waters, excessive usage (because of war or warlike conditions) of machinery or equipment, navigating (contrary to peacetime custom) under the direction of naval, military, coast guard or other governmental authorities, discharging alongside ships or into ships except lighters, or ice.

(2) During any loss of time for which the Owner receives full hire under this Article it shall be the duty of the Owner to credit any savings to the Charterer. Savings, for the purpose of this paragraph, shall have the same meaning as that set forth in Article 30(c) of this Charter.

(b) If a general average situation arises and the Owner becomes entitled to recover in general average from hull underwriters, cargo, or other interests in the adventure for sacrifices of wages, stores, or other like expenditures which would otherwise be for the account of the Owner under this Charter, the Charterer shall be credited with any amounts recoverable by the Owner in respect of all such expenditures incurred by the Owner during any period when the Charterer is liable to the Owner for hire under the terms of this Article.

ARTICLE 30. REDELIVERY.

(a) Unless lost, the Vessel shall be redelivered in accordance with paragraph (d) of Article 2. The Charterer shall give the Owner not less than 20 days notice (confirmed by telegram or letter, if oral) of the Vessel's expected date and range of redelivery and 10 days notice (confirmed by a telegram or letter) of the Vessel's actual port of redelivery. It shall be the duty of the Owner to minimize his expense during any period while the Vessel is in port subsequent to the receipt of the notice of redelivery and prior to the actual redelivery, crediting to the Charterer any savings.

(b) It shall be the duty of the Charterer to perform prior to redelivery of the Vessel, all repairs except for ordinary wear and tear and depreciation, removals and other work which under the terms of this Contract are for the account of the Charterer; however, the Charterer may elect to redeliver the Vessel without performing such work, in which case the Owner will be given not less than 10 days notice of such election and the Charterer shall reimburse the Owner for (i) the cost of performing such work and repairs less a deduction for ordinary wear and tear and depreciation; and (ii) charter hire and fuel cost for the time lost for such repairs beyond the time which would otherwise have been used for the repairs of Owner, less any estimated savings the Owner should have been able to effect during such time. Should the Owner elect to defer making such repairs the Charterer may pay to the Owner sums to be agreed between the Owner and Contracting Officer representing the estimated cost of performing such work and repairs less a deduction for ordinary wear and tear and depreciation; except, however, if the Vessel will not be repaired because it is lost after the termination of this Charter or shall be scrapped or sent to a lay-up fleet no payment for estimated repair costs will be made. In the event the Charterer elects to redelivery the

Vessel without performing the work for its account this Charter shall be amended to reflect the amount of the payments to be made under this Article. Any failure to agree with respect to the amounts to be paid hereunder shall be deemed a dispute and settled in accordance with the "Disputes" Article. Storage of any Government-owned property removed by the Owner under this Article shall be at the risk and expense of the Government.

(c) Savings, for the purposes of this Article and Article 32, shall mean any savings whatsoever effected by the Owner in respect to the operation and management of this Vessel including but not limited to: wages of Master, Officers or crew, including economic price adjustment; subsistence, and returns, if any, of insurance premiums (or in the case of self-insurers, a comparable amount) and insurance recovery, if any. For the purpose of computing savings and expenses, any period of twelve (12) consecutive hours or less shall be disregarded and any period exceeding twelve (12) consecutive hours but less than twenty-four (24) hours shall be counted as one day.

ARTICLE 31. CHARTER NOT A DEMISE.

Nothing herein contained shall be construed as creating a demise of the Vessel to the Charterer, the Owner under this Charter retaining complete and exclusive possession and control of the Vessel and its navigation.

ARTICLE 32. REDUCED OPERATIONAL STATUS.

(a) The Charterer may at its option and upon notice to the Owner in accordance with the provisions of subparagraph (c) place the Vessel in reduced operational status. During any such period the Charterer shall pay for the use and hire of the Vessel at the rate stated in paragraph (e) of Article 2, per 24-hour day or pro rata for part thereof less any actual savings as provided in Article 30(c).

(b) During any such period of reduced operational status the Charterer shall have the privilege of performing repairs or other work for its account and the Owner shall have the privilege of performing voyage repairs or maintenance work for its account. If, however, during such period the performance of any such repairs or work for Owner's account requires dry-docking the Vessel, the payment of hire shall cease during the time the Vessel is in dry dock and during the time required to move the Vessel to dry dock and return to the point where she was placed in reduced operational status.

(c) The Charterer shall give the Owner written or telegraphic notice or in the event notice is given by telephone, written or telegraphic confirmation of exercise of the option specified in subparagraph (a) above. Such notice shall specify the time at which the period of reduced operational status is to commence, which time shall not be less than 48 hours, subsequent to the receipt of such notice by the Owner or his representative. The Charterer shall give the Owner written or telegraphic notice, or in the event notice is given by telephone, written or telegraphic confirmation of termination of the period of reduced operational status. Such notice shall specify the time at which such period shall terminate, which time shall be at least 72 hours (Saturdays, Sundays and holidays excluded) subsequent to the receipt of said notice by the Owner or its representative; provided however, that by agreement between the Owner and the Charterer the Vessel may be returned to full operational status before the time specified in the notice of termination of the reduced operational period.

(d) During periods of reduced operational status, Owners will reduce the crew on board to the least number of men consistent with practical maintenance standards. The number of personnel remaining on board during ROS periods will be subject to the approval of the Contracting Officer.

(e) With respect to any period covered by this Article the Charterer shall reimburse the Owner for all expenses actually incurred by the Owner by reason of his agreements to provide return transportation for any Officers or members of the crew signed off Articles during any such period (but not in excess of the amount set out in applicable agreements with recognized labor unions). The Charterer agrees to reimburse the Owner for all expenses necessarily incurred in accordance with the Owner's labor agreements for obtaining crew replacements at the time of the reactivation of the Vessel from idle status by the Charterer.

ARTICLE 33. INSPECTION.

(a) The vessel shall be subject to the Government's inspection as to suitability for the required service as stated in Article 4(b) prior to delivery. If, in the opinion of the Government Inspector, the vessel is inadequate for the intended service, the Government reserves the right to reject the vessel, and in that event, this charter shall be null and void. The decision of the Contracting Officer regarding the adequacy of the vessel based on the inspection shall be final.

(b) The vessel shall be subject to subsequent inspections at reasonable intervals and at such times as deficiencies exist to determine the continuing suitability of the vessel for the required service as well as to determine whether the material condition of the vessel will prevent effective operation during basic and optional periods of the contract. Such inspections shall include in addition to the items enumerated in paragraph 2, but not be limited to:

- (1) Condition and tightness of hatch openings/cargo spaces
- (2) Condition and tightness of hull and deck plating
- (3) Condition of cargo handling gear
- (4) Communication and Navigational equipment
- (5) General condition and maintenance of vessel(s)
- (6) Condition and availability of general safety and firefighting equipment
- (7) Engineering spaces and equipment

(c) The Government further reserves the right to have the vessel(s) surveyed at any time by an independent surveyor.

(d) If, in the opinion of Government Inspector, deficiencies exist that preclude the adequacy of the vessel(s) for the assigned service, a notice for correction will be issued. In the event that the stated deficiencies are not corrected in a reasonable period of time and in the opinion of the Contracting Officer based upon the recommendation of the Government Inspector, and/or the independent surveyor the vessel(s) is inadequate for the intended service or unable to operate for the remaining period of the contract as a result of these deficiencies the Government reserves the right to cancel the contract at any time during the term of the charter.

ARTICLE 34. EVENTS OF DEFAULT.

(a) If the Owner fails to perform any of its obligations contained in this Charter and such failure was not due to the fault of the Charterer or any other representative of the Government acting in an official capacity and within the limits of his authority or such failure is not excused by Article 24 and if as a result of such failure, the Charterer is denied the full use of the Vessel, then for any period exceeding twelve (12) hours that the Vessel is not available for the Charterer's use, the Owner shall pay to Charterer at Charterer's option and on demand an amount equal to the charter hire and economic price adjustment in effect for that period of time lost. This amount shall not be paid if the Vessel was off-hire under Article 19 during that period, and the amounts payable by the Owner pursuant to this Article 33 are payable as liquidated damages (and not as a penalty) agreed to by the parties hereto as the fairest measures of Charterer's actual damages which are difficult if not impossible to ascertain; and, accordingly, it is agreed that Charterer shall be under no duty or obligation to mitigate or otherwise reduce the amount of such liquidated damages.

(b) No remedy herein conferred upon the Charterer is intended to be exclusive of any other remedy, but every such remedy shall be cumulative and shall be in addition to every other remedy herein conferred or now or hereafter existing at law or in equity or by statute.

(c) The Government may, by written notice of default to the Contractor, terminate the whole or any part of this Contract in any of the following circumstances:

(1) Whenever, in any given six (6) month period for any reason whatsoever, more than 12 days are lost, the Contractor shall be deemed to be in default in performance under the Contract and pursuant to which the Contracting Officer may at his discretion terminate for default; or

(2) If the Contractor fails to perform any of the other provisions of this Contract, and does not cure such failure within a period of 10 days (or such longer period as the Contracting Officer may authorize in writing) after receipt of notice from the Contracting Officer specifying such failure.

ARTICLE 35. WAIVER OF CLAIMS.

All claims whatsoever for moneys due the Owner under this Charter must be submitted in accordance with the applicable billing instructions within two years of the date of redelivery of the Vessel. All claims not submitted within the two-year limit shall be deemed to have been waived by the Owner.

ARTICLE 36. GOVERNMENT CLAUSES.

Government clauses attached as Annex B to this Charter are incorporated herein by reference and are made a part of this Charter.

ARTICLE 37. SPECIAL PROVISIONS.

The provisions of this Article shall prevail over any other provisions herein inconsistent therewith.

(a) In addition to the characteristics specified in Article 1 of this Contract, Owner warrants that:

(1) vessel has a satisfactory means of securing all access scuttles to vessel's holds and spaces as well as means for securing access to cargo compartments through ventilation ducts or any other openings providing access to such compartments or spaces, and

(2) in addition to communications/navigational equipment described in Annex "A" and in Article 1 of this Contract, vessel has MARISAT communications equipment in good operating condition for linkage with world wide MARISAT system.

(b) In the event that the Charterer directs the vessel to engage in coastwise trade and as a result of each coastwise employment the Owner must reimburse MARAD for a specified percentage of the Construction Differential Subsidy provided to build the vessel, the Charterer will reimburse the Owner for such repayments made to the Maritime Administration.

(c) The Charterer agrees to reimburse the Owner for necessary communication expenses incurred in the operation of the vessel except when such expenses are the Owner's obligation or are incurred for the convenience of the Owner, the vessel, its Master, Officers or crew.

Each of the provisions of this Charter Party shall be deemed severable, if any provisions, or part thereof, should be held to be invalid, illegal, or unenforceable the remaining provisions, or part thereof, shall continue in full force and effect.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

BY _____

BY _____

(TITLE)

Contracting Officer
Military Sealift Command
Department of the Navy

CERTIFICATE

CERTIFICATE

I, _____, certify that I am the _____ of the corporation named as Contractor herein; that _____ who signed this Contract on behalf of the Contractor was then _____ of said corporation; that said Contract was duly signed for and in behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of said corporation this _____ day of _____ 19_____.

(CORPORATE SEAL)

Communications Capability. The Owner represents that the vessel is equipped with the following minimum communications capability and further agrees to install additional radio crystals as may later be required by the Charter.

- (1) A radiotelegraph station as outlined in Subpart R, Part 83 of the Federal Communications Commission Rules and Regulations as evidenced by a current Cargo Ship Safety Radiotelegraphy Certification and/or FCC Station License.
- (2) One radio receiver, high frequency: Minimum frequency range 2-24 MSC, A-1/A-2/A-3j emission. (SEPARATE FROM MAIN RECEIVER)
- (3) One radio transmitter, high-frequency: Minimum frequency range 2-24 MCS, A-1 emission, capable of meeting the requirements of Articles 83.317 and 83.319 of the FCC Rules and Regulations (SYNTHESIZED FREQUENCY CONTROL)
- (4) One HF radiotelephone transmitter/receiver: Minimum frequency range 2-30 MCS, 2.8 A-3j emission. Synthesized frequency control for all marine band frequencies. (MINIMUM TRANSMITTER RF POWER OUTPUT 100 WATTS)
- (5) Crystals for operation on the following output frequencies: (ALTERNATE MEANS OF FREQUENCY CONTROL PERMITTED PROVIDED THAT FREQUENCY TOLERANCES NOT EXCEEDED)

MF Transmitter

432 KCS
444 KCS
468 KCS

- (6) HF radio teletype transmit/receive system (F1 emission) with selective calling device (SELCALL) and error correction device (SITOR) installed in the system. Minimum frequency range 2-30 MHZ and minimum transmitter RF power output 1000 watts.
- (7) Maritime satellite (Marisat) system with bridge voice remote unit.

The above requirements are not intended to restrict the utilization of the installed radio equipment for normal communications on other assigned or required frequencies.

APPENDIX C

VOYAGE COST ANALYSIS FOR FY83 VOYAGE #010 OF THE
AMERICAN MONARCH COMMENCING IN BAYONNE, NEW JERSEY
ON 28 MARCH 1983 AND ENDING IN NORFOLK, VIRGINIA
ON 30 JUNE 1983

[Data provided by MSC PAC (3T3)]

FUEL/TIME/DISTANCE

	ARRIVAL DTG	DEPARTURE DTG	FUEL (BBL.) ON ARR	FUEL (BBL.) ON DEPART	FUEL BURNED IN PORT	FUEL BURNED AT SEA	SPEED ENCOUTE	DISTANCE	AMOUNT
Start									
BAYONNE	281000 MAR 83	300124	8418	8245	173	330	21.4	241	
NORFOLK	301240 MAR 83	310635	7915	7795	120	457	18.8	392	
CHARLESTON	010324 APR 83	020754	7338	7177	161	1507	19.2	1062	10009
NEW ORLEANS	041506 APR 83	061100	5670	15335	344	190	18.2	120	
MOBILE	061736 APR 83	110412	15145	14640	685	1935	19.5	1393	
CANAL ZONE	140220 APR 83	151316	12705	12495	210	5658	18.7	4715	
PEARL	260024 APR 83	270030	6837	6720	117	4888	19.0	4188	2032
PUSAN	060442 MAY 83	090106	1832	3595	269	1043	19.9	848	13277
YOKOHAMA	101948 MAY 83	120100	2552	15680	149	15	12.0	12	
YOKOSUKA	120200 MAY 83	122324	15665	15550	115	988	18.5	849	
NAHA	142348 MAY 83	181539	14562	14140	422	1274	21.4	897	
SUBIC	200930 MAY 83	242336	12876	12340	536	2283	22.1	1515	
GUAM	272006 MAY 83	311300	10057	9625	432	4452	19.5	3330	
PEARL	071548 JUN 83	090806	5173	4965	208	3033	19.7	2089	13509
OAKLAND	131754 JUN 83	151512	1932	15210	231	614	20.9	432	
SAN DIEGO	161154 JUN 83	171412	14596	14490	106	3705	19.1	2843	
CANAL ZONE	231918 JUN 83	240724	10785	10660	125	2010	19.8	1552	
CHARLESTON	271336 JUN 83	280200	8650	8538	112	393	14.9	429	
NORFOLK	290648 JUN 83	300240	8145	7996	149				
End									

PORT/SEA COST

	DAYS IN PORT	CHARTER (18,125)	PORT CHARGES	FUEL COST	TOTAL	DAYS AT SEA	CHARTER	FUEL	TOTAL
Start									
BAYONNE	1.64	29755	2186	6612	38553	--	--	--	--
NORFOLK	.75	13531	4213	4586	22330	.47	8509	12613	21122
CHARLESTON	1.19	21523	6000(E)	6153	33693	.87	15721	17467	33188
NEW ORLEANS	1.83	33154	6500(E)	13148	52802	2.30	41688	57598	99286
MOBILE	4.44	80505	6000(E)	26181	112686	.28	4984	7262	12246
CANAL ZONE	1.46	26382	22000(E)	8026	56408	2.92	52965	73956	126921
PEARL	1.00	18201	3118	4472	25791	10.46	189658	216249	405907
PUSAN	2.85	51656	2435	10281	65372	9.18	166297	186819	353116
YOKOHAMA	1.22	22052	5933	5695	33680	1.78	32247	39863	72110
YOKOSUKA	.89	16161	4062	4395	24618	.04	755	573	1328
NAHA	3.66	66345	4558	16129	87032	2.02	36552	37761	74313
SUBIC	4.59	83148	2386	20486	106020	1.74	31605	48692	80297
GUAM	3.70	67138	4423	16511	88072	2.85	51732	87256	138988
PEARL	1.68	30435	3223	7950	41608	7.12	128990	170155	299145
OAKLAND	1.89	34211	25025	8829	68065	4.41	79901	115921	195822
SAN DIEGO	1.10	19862	3942	4051	27855	.86	15633	23467	39100
CANAL ZONE	.50	9138	27315	4778	41231	6.21	112602	141605	254207
CHARLESTON	.50	9365	6000(E)	4281	19646	3.26	55057	76822	135879
NORFOLK	.83	15003	5000(E)	5695	25698	1.20	21750	15020	36770
End									

PORT CHARGES

	PILOT	TUG	LINEHANDLER	AGENT	DOCKAGE	CUSTOMS	VAN	ENTRY/EXIT	MISC	TOTAL
Start										
BAYONE	1233	1746	120							2186
NORFOLK	1740	2123		350						4213
CHARLESTON										6000(E)
NEW ORLEANS										6500(E)
MOBILE										6000(E)
CANAL ZONE										22000(E)
PEARL	274	1881	338	625						3118
PUSAN	563	1231	41	600						2435
YOKOHAMA	2120	2616	197	1000						5933
YOKOSUKA	1086	1787	102	1000				87		4062
Naha	670	3396	492							4558
SUBIC	161	1050		1100			75			2386
GUAM	592	2600	300	800		131				4423
PEARL	313	1437	405	1025		43				3223
OAKLAND	1200	2960	952	950		50	18438	300	175	25025
SAN DIEGO	890	1960		961		62			125	3942
CANAL ZONE		2145	2045					23085	40	27315
CHARLESTON										6000(E)
NORFOLK										5000(E)
End										

CARGO FLOW

	NORFOLK	CHARLESTON	NEW ORLEANS	SUBIC	GUAM	NAIA	PUSAN	YOKOHAMA	YOKOSUKA	PEARL
BAYONNE										
GEN			158	61	4	3	615			82
POV	16		9					2		
SPEC			25	61	313		247	19		171
AMMO						5				
NORFOLK										
GEN		4	112	45	4	15				
SPEC			123	12	126	31	35		220	682
CHARLESTON										
GEN			77	2	4	8		2		
SPEC							532	6		
NEW ORLEANS										
GEN				70	83	136	32	9	85	15
POV					21					393
AMMO										3
MOBILE										
GEN		•		143		82				
SPEC				479	160	1446	560		64	78
AMMO				2						
PEARL										
GEN				190		96	22	1	44	
POV				83		10	30			
SPEC				51						

CARGO FLOW (Continued)

	YOKOHAMA (YOKOSUKA)	NAHA	SUBIC	GUAM	PEARL	OKLAND	SAN DIEGO	CHARLESTON	NORFOLK	RAYONNE	NEW ORLEANS	MOBILE
PUSAN												
GEN	1 (1)	392	64	4	11	61	90		47	6	8	4
POV					20	51		8	14	8	45	
SPEC		29			23	41						
AMMO						82						
NAHA												
GEN		153	51	341	2	1			45			
POV		14	26	14				13	22	8	16	
SPEC		164	200									
YOKOHAMA												
GEN		100	28	115			71		12	3	1	
POV		8										
SPEC		28	65	23								
NAHA												
GEN			152	67	163	165	161	22	54	28	44	
POV			8	8		29	4	8	2	14	30	
SPEC			27				41		17			
NSCV			64 (7)									
			POV									
SUBIC												
GEN			689	835			71	1	35	2	33	
POV			44									
SPEC			176									
NSCV			128 (4)	192 (6)							160	
			POV	POV								

CARGO FLOW (Continued)

	PEARL	OAKLAND	SAN DIEGO	CHARLESTON	NORFOLK	BAYONNE	NEW ORLEANS
GUAM							
GEN	266	736	37	4	3	60	289
POV	132			2			
SPEC	67	114	148				18
MSCV		896(28) POV					
PEARL							
GEN			268	5	75	78	21
POV			8	3			
SPEC			138	138	617		
OAKLAND							
GEN				3	106		
POV				76	526		
SPEC					32(11)		
MSCV					GCN		
SAN DIEGO							
GEN							187
SPEC							18

LIST OF REFERENCES

1. Commander, Military Sealift Command UNCLASSIFIED Letter Serial C66M32, Subject: MSC Dry Cargo Controlled Fleet Utilization, 16 August 1976
2. Commander, Military Sealift Command UNCLASSIFIED Memorandum Serial M-321/RP/mjm/drc, Subject: Dedicated Three-Coast/Far East Service, 9 February 1977.
3. Commander, Military Sealift Command, Atlantic UNCLASSIFIED Message 092023Z SEP 77, Subject: Tri-Coast Service Schedule.
4. Commander, Military Sealift Command UNCLASSIFIED Message 181731Z OCT 78, Subject: Tri-Coast Service.
5. Commander, Military Sealift Command, Pacific UNCLASSIFIED Message 182332Z JUL 79, Subject: Combined Service Management.
6. Rumbaugh, D., CSM, Point Paper (COMSC M-3T11b), 1 June 1983.
7. Commander, Military Sealift Command, Pacific UNCLASSIFIED Message 062210Z DEC 78, Subject: Tri-Coast Service.
8. Commander, Military Traffic Management Command UNCLASSIFIED Unserialized Letter, Subject: NSC, San Diego Port Operations, 21 March 1980.
9. Commander, Military Sealift Command, Pacific UNCLASSIFIED Message 161734Z APR 79, Subject: Ship Configuration/Cargo Stowage.
10. Telephone conversation with D. Rhodes, Budget Director (M-51), Military Sealift Command, Washington, DC, 23 August 1983.
11. "Maritime Administration," Defense Transportation Journal, February 1983.
12. Jolliff, James V., "The Maritime Dilemma," Naval Engineers Journal, December 1970.

13. M. Rosenblatt and Son, Inc., The National Defense Relevance of the World's Dry Cargo Fleet, report prepared for the Maritime Administration, June 1982.
14. Bryan, R.A. and Sparks, C.J., "The National Defense Reserve Fleet - An Essential Element of National Defense," Naval Engineers Journal, April 1977.
15. Frankel, E.G. and Marcus, H.S., Ocean Transportation, The MIT Press, 1973.
16. Munro-Smith, R., Merchant Ship Types, Marine Media Management Limited, 1975.
17. Hiltzheimer, C.I., "The Merchant Marine Dilemma," Defense Transportation Journal, October 1981.
18. Merchant Marine Policy, Reese, Howard C. (ed), Cornell Maritime Press, Inc., 1963.
19. Luciano, Peter J., "Sealift Capability: A Dwindling Defense Resource," Defense Management Journal, Third Quarter 1982.
20. Narmi, Ronald E., "Sustaining the Industrial Base During Mobilization," Defense Transportation Journal, December 1982.
21. Chief of Naval Operations Instruction 4700.13C, Subject: Review and Approval of Merchant Ship Designs Under the Provisions of the Merchant Marine Act of 1936, as amended, 6 December 1978.
22. Carroll, Kent J., "Sealift's Role in Strategic Mobility," Defense Transportation Journal, August 1982.
23. Baker, Warren P., "The Strategic Dimensions of Maritime Power," Sea Power, November 1980.
24. Military Sealift Command Report 3110-4 for the period 25 March - 7 April 1983.
25. Military Sealift Command Ship Register (MSC P504), January 1983.
26. Bess, David, Marine Transportation, The Interstate Printers and Publishers, Inc., 1976.

27. Naval Intelligence Support Center, Naval Intelligence Technical Summary (NITS) - New Construction of Merchant Ships - 1978 - A Worldwide View, by John M. Jedrling, August 1979.
28. "MARAD '78," The Annual Report of the Maritime Administration, U.S. Department of Commerce, May 1979.
29. "MARAD '81," The Annual Report of the Maritime Administration, U.S. Department of Commerce, October 1982.
30. Changes in Federal Maritime Regulation Can Increase Efficiency and Reduce Costs in the Ocean Liner Shipping Industry, PAD-82-111, Comptroller General's Report to the Chairman of the Committee of Merchant Marine and Fisheries, U.S. House of Representatives, 2 July 1982.
31. Telephone interview with Mr. Larry Mellan, Committee on Merchant Marine and Fisheries, U.S. House of Representatives, 14 and 15 September 1983.
32. Hearings before the Subcommittee on Merchant Marine of the Committee on Merchant Marine and Fisheries, U.S. House of Representatives, 97th Congress (1st Session) on the U.N. Conference on Trade and Development (UNCTAD) Oversight, 2 April 1981.
33. Zerby, J.A., "On the Practicality of the UNCTAD 40-44-20 Code for Line Conferences," Maritime Policies and Management, Vol. 6, No. 4, 1979.
34. Schmidt, Lienhard, "The International Policy Issues at UNCTAD V, Manila, May 1979," Maritime Policies and Management, Vol. 6, No. 4, 1979.
35. Hearings before the Subcommittee on Merchant Marine of the Committee on Merchant Marine and Fisheries, U.S. House of Representatives, 96th Congress (1st Session) on the U.N. Conference on Trade and Development (UNCTAD) Oversight, 26 April 1979.
36. Telephone interview with Mr. Bourdon, Office of International Activities, Maritime Administration, 15 September 1983.

37. Harrington, Lisa H., "Intermodal Update: Future Bright but Experts Cautious," Traffic Management, April 1981.
38. Harper, Donald V., "1980 Motor Carrier Act," Transportation Journal, Winter 1980.
39. Ferrell, Jack W., "Railroads - A New Generation," Traffic Management, April 1981.
40. "2651 Pages of Minibridge Testimony Without a Word of Protest by Shippers Satisfies the Judge - It Must Be Okay," American Shipper, Vol. 19, No. 8, August 1977.
41. Coyle, John J., Bardi, Edward J., and Cavinato, Joseph L., Transportation, West Publishing Company, 1982.
42. Whitehurst, Clinton H. Jr., The Defense Transportation System, American Enterprise Institute for Public Policy Research, 1976.
43. Leham, John F., "Reversing the Tide: Strengthening Our Merchant Marine," Defense Management Journal, Third Quarter 1982.
44. Transportation Programs for National Defense, Military Traffic Management Command, September 1982.
45. Military Sealift Management Command, Terminal Facilities Guide (AR-55-357), Cargo Mission Summary, updated December 1982.
46. Operations Research, Inc., Technical Report No. 1037, Report on the Results of the Conventional Breakbulk Ship Pretest of the Joint Logistics-Over-the-Shore (LOTS) Test and Evaluation Program, 29 October 1976.
47. Operations Research, Inc., Technical Report No. 1168, Heavy-lift Breakbulk Ship Pretest Results of the Joint-Logistics-Over-the-Shore (LOTS) Test and Evaluation Program, 25 July 1977.
48. Telephone conversation with Jean Barile, Military Sealift Command (MSC-3R6), Subject: Current Status of the Sealift Expansion Program/Ready Reserve Force, 7 October 1983.

49. Hearings before the Committee on Merchant Marine and Fisheries, U.S. House of Representatives, 97th Congress (1st Session) on the Defense Sealift Capability, 3 June and 9 July 1981.
50. Commander, Military Sealift Command, Far East UNCLASSIFIED Message 120536Z MAY 83, Subject: CSM Review.
51. Commander, Military Sealift Command, Pacific TWX to Commander, Military Sealift Command, Subject: MSC Controlled Ship Utilization Study, May 1982.
52. Kellman, M. and Shneerson, D., "The Economics of Conventional Liner Breakbulk Cargo Handling Efficiency," Maritime Policy and Management, Vol. 4, No. 4, April 1977.
53. Telephone conversation with Major Steve Curtain, USA, Naval Physical Distribution Management School, 25 October 1983.
54. Military Sealift Command, Pacific (3T2), Staff Functions for MSC Cargo Ships and Tanker Operations Branch, 1978.
55. Higgins, J.A. and Garvey, J.J., "Merchant Ships for the Seventies," Naval Engineers Journal, December 1970.
56. U.S. Navy's Military Sealift Command, 1982 Annual Report (Financial and Statistical Review), Part I.
57. Cook, H. Clayton Jr., "Cargo and Investment in the United States Merchant Marine," Defense Transportation Journal, August 1982.

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